Appendix N

Biological Assessment

TransWest Express Transmission Project Biological Assessment

Prepared on Behalf of:

U.S. Department of the Interior, Bureau of Land Management
Wyoming State Office

Prepared by:

AECOM
Fort Collins, Colorado

April 8, 2015

Executive Summary

The TransWest Express Transmission Project (Project) is a proposed 600-kilovolt, direct current transmission system that would extend approximately 728 miles across public (federal and state) and private lands in Wyoming, Colorado, Utah, and Nevada. The Project would provide the transmission infrastructure and capacity necessary to deliver approximately 3,000 megawatts of electric power from renewable and/or non-renewable energy resources in south-central Wyoming to southern Nevada. The northern terminal would be located near Sinclair, Wyoming, and the southern terminal would be located at the Marketplace Hub in the Eldorado Valley near Boulder City, Nevada. Other project facilities would include two ground electrode systems, 12 to 15 fiber optic communication and regeneration facilities, and access roads.

Table ES-1 summarizes the species analyzed in this Biological Assessment, the states in which they occur in the Project action area or in which water withdrawals could occur that would affect downstream species, species' listing status, and the determinations of effect to the species and critical habitat, if designated.

Table ES-1 Species and Critical Habitat Determinations

Species	State[1]	Federal Status	Species Determination	Critical Habitat Determination
Federally Listed Threatened and Endangered Species				
Canada Lynx	Wyoming, Colorado, Utah	Threatened	May affect, not likely to adversely affect	Not applicable
Gray Wolf	Utah, Colorado	Endangered, EXP/NE	May affect, not likely to adversely affect	Not applicable
Utah Prairie Dog	Utah	Threatened	May affect, not likely to adversely affect	Not applicable
California Condor	Utah, Nevada	Endangered, EXP/NE	May affect, not likely to adversely affect	No effect: Critical habitat is well outside action area
Southwestern Willow Flycatcher	Nevada	Endangered	May affect, not likely to adversely affect	No effect: Critical habitat is well outside action area
Yuma Clapper Rail	Nevada	Endangered	May affect, not likely to adversely affect	Not applicable
Western Yellow-billed Cuckoo	Wyoming, Colorado, Utah, Nevada	Threatened	May affect, not likely to adversely affect	May affect, not likely to adversely modify proposed critical habitat
Mojave Desert Tortoise	Utah, Nevada	Threatened	May affect, likely to adversely affect	May affect, likely to adversely affect
Bonytail[3]	Colorado, Utah	Endangered	May affect, likely to adversely affect	May affect, likely to adversely affect
Colorado Pikeminnow	Wyoming, Colorado, Utah	Endangered	May affect, likely to adversely affect	May affect, likely to adversely affect
Humpback Chub[3]	Colorado, Utah	Endangered	May affect, likely to adversely affect	May affect, likely to adversely affect
June Sucker	Utah	Endangered	May affect, not likely to adversely affect	May affect, not likely to adversely affect
Razorback Sucker	Wyoming, Colorado, Utah, Nevada	Endangered	May affect, likely to adversely affect	May affect, likely to adversely affect

Table ES-1 Species and Critical Habitat Determinations

Species	State[1]	Federal Status	Species Determination	Critical Habitat Determination
Virgin River Chub	Nevada	Endangered (Virgin River)	May affect, not likely to adversely affect[2]	No effect: critical habitat is well outside action area
Barneby Ridgecress	Utah	Endangered	May affect, not likely to adversely affect	Not applicable
Clay Phacelia	Utah	Endangered	May affect, not likely to adversely affect	Not applicable
Deseret Milkvetch	Utah	Threatened	May affect, not likely to adversely affect	Not applicable
Ute Ladies'-tresses Orchid	Wyoming, Colorado, Utah	Threatened	May affect, not likely to adversely affect	Not applicable
Species Proposed for Federal Listing and EXP/NE Populations of Listed Species				
Black-Footed Ferret	Wyoming, Colorado, Utah	Endangered - EXP/NE	Not likely to jeopardize; BLM is conferencing on this species	Not applicable
Candidates for Federal Listing				
Greater Sage-Grouse	Wyoming, Colorado, Utah	Candidate	Not Applicable	Not Applicable
Platte River Species[3]				
Interior Least Tern	Wyoming	Endangered	May affect, likely to adversely affect	Not applicable
Piping Plover	Wyoming	Threatened	May affect, likely to adversely affect	Not applicable
Whooping Crane	Wyoming	Endangered	May affect, likely to adversely affect	May affect, likely to adversely affect
Pallid Sturgeon	Wyoming	Endangered	May affect, likely to adversely affect	Not applicable
Western Prairie Fringed Orchid	Wyoming	Threatened	May affect, likely to adversely affect	Not applicable

[1] State in which species occurs in Project action area or state in which water depletions could occur that would affect species downstream of the withdrawal site.

[2] Determination is made for Muddy River population, which is not part of the listed population.

[3] Affected by water depletions only.

1

Acronyms and Abbreviations

°F	degrees Fahrenheit
AASHTO	American Association of State Highway and Transportation Officials
AC	Alternating current
AGFD	Arizona Game and Fish Department
amsl	Above mean sea level
ANSI	American National Standards Institute, Inc.
AOU	American Ornithologists' Union
APA	Agency Preferred Alternative
APLIC	Avian Power Line Interaction Committee
APP	Avian Protection Plan
ATV	All-terrain vehicle
AWBP	Aransas-Wood Buffalo National Park
BA	Biological Assessment
BE	Biological Evaluation
BHCA	Bird Habitat Conservation Area
BLM	Bureau of Land Management
BMP	Best Management Practice
BO	Biological Opinion
BRTG	Biological Resources Task Group
CDOW	Colorado Division of Wildlife
CFR	Code of Federal Regulations
CGSSC	Colorado Greater Sage-grouse Steering Committee
cm	centimeters
CNHP	Colorado Natural Heritage Program
COM Plan	Construction, Operation, and Maintenance Plan
COT	Conservation Objectives Team
CPW	Colorado Parks and Wildlife
CWA	Clean Water Act
CWS	Canadian Wildlife Service
dBA	Decibels on the A weighted scale
DC	Direct current
DEQ	Department of Environmental Quality
DOE	U.S. Department of Energy
DPS	U.S. Distinct Population Segment
ECOS	Ecological Conservation Online System
EIS	Environmental Impact Statement
EMF	electric and magnetic field
EO	Executive Order
ESA	Endangered Species Act
EXP/NE	experimental, non-essential
EXPA	Experimental Population Area
FAA	Federal Aviation Administration
FCR	Field Contact Representative

FO	Field office
FR	Federal Register
GIS	Geographic information system
GPS	Global Positioning System
HEA	Habitat Equivalency Analysis
HUC	Hydrographic Unit Code
I-80	Interstate 80
IBA	Important Bird Area
IM	Instruction Memoranda
IPaC	Information, Planning, and Conservation System
IPP	Intermountain Power Project
IRA	Inventoried roadless area
IVM	Integrative vegetation management
km	Kilometer
kV	Kilovolt
LADWP	Los Angeles Department of Water and Power
LAU	Lynx Analysis Unit
LCAS	Lynx Conservation Assessment Strategy
LRMP	Land Resource Management Plan
LRP	Limited revegetation potential
mm	millimeters
MOA	Military Operation Area
MOU	Memorandum of Understanding
mph	Miles per hour
MW	Megawatt
MZ	Management Zone
NAGPRA	Native American Grave Protection and Repatriation Act of 1990
NDOW	Nevada Department of Wildlife
NEP	non-essential population
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Corporation
NFS	National Forest System
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NNHP	Nevada Natural Heritage Program
NPDES	National Pollutant Discharge Elimination System
NTT	National Technical Team
NWR	National Wildlife Refuge
NWReGAP	Northwest Regional Gap Analysis Project
ODFW	Oregon Department of Fish and Wildlife
OHV	Off-highway vehicle
PAC	Protected Activity Center
PBO	Programmatic biological opinion
PDEIS	Preliminary Draft Environmental Impact Statement
PDTR	Project Description Technical Report
PGH	Preliminary General Habitat
POD	Plan of Development

PPH	Preliminary Priority Habitat
ppm	Parts per million
Project	TransWest Express Transmission Project
PRRIP	Platte River Recovery Implementation Program
psi	Pounds per square inch
PUP	Pesticide Use Proposal
RMP	Resource Management Plan
ROD	Record of Decision
ROW	Right-of-way
RU	Recovery Unit
SAIC	Science Applications International Corporation
SCCA	South Central Wyoming Conservation Area
SH	State Highway
STS	Southern Transmission System
SWPPP	Stormwater Pollution Prevention Plan
SWReGAP	Southwest Regional Gap Analysis Project
TL	Timing Limitations
UDWR	Utah Division of Wildlife Resources
UHF	ultra-high frequency
UNHP	Utah Natural Heritage Program
USACE	U.S. Army Corps of Engineers
USC	United States Code
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VHF	very high frequency
WDFW	Washington Department of Fish and Wildlife
Western	Western Area Power Administration
WGFD	Wyoming Game and Fish Department
WUS	Waters of the U.S.
WWEC	West-wide Energy Corridor
WYNDD	Wyoming Natural Diversity Database
YOY	Young-of-year

1

Contents

List of Tables

List of Figures

1.0 Introduction

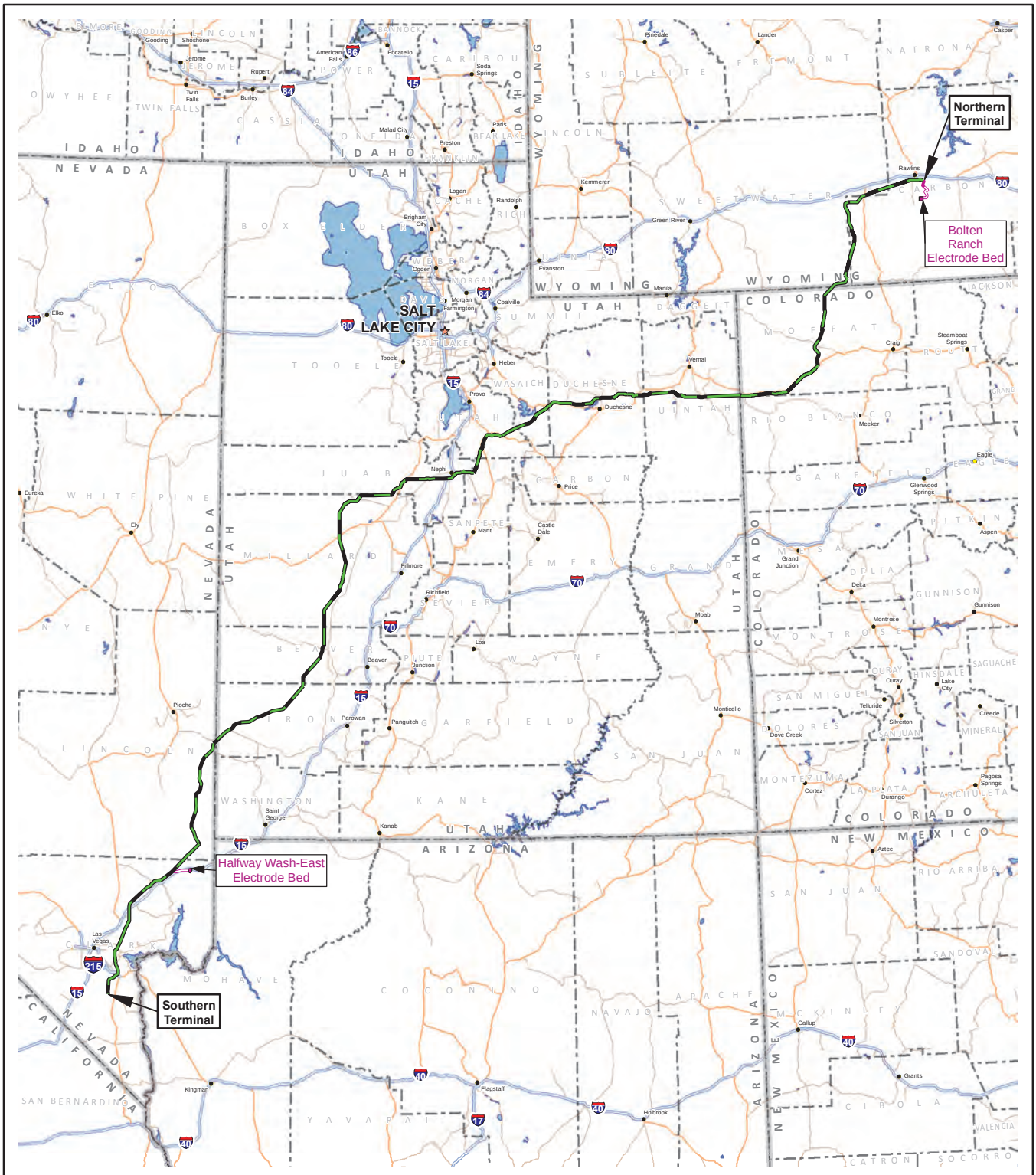
1.1 Purpose of Document

This biological assessment (BA) presents the potential effects of the TransWest Express Transmission Project (TWE or Project), a proposed ultra-high voltage direct current (DC) transmission line extending from south-central Wyoming to southern Nevada, on federally listed threatened and endangered species and species that have been proposed or are candidates for listing under the Endangered Species Act of 1973, as amended (ESA) (16 United States Code [USC] Section 1531 et seq.). Under the direction of the lead federal agencies, the Bureau of Land Management (BLM) and Western Area Power Administration (Western), a draft environmental impact statement (EIS) for the proposed Project was released in July of 2013. It is currently anticipated that a Final EIS for the Project will be available in April of 2015. A Record of Decision (ROD) for the Project is expected to be issued early September of 2015.

This BA has been prepared for the purpose of consultation (per Section 7 of the ESA) between the action agencies (i.e., BLM, Western, and the U.S. Forest Service [USFS]); and the U.S. Fish and Wildlife Service (USFWS) on the expected effects of the TWE agency preferred alternative (hereafter referred to as the Proposed Action) on threatened and endangered species with potential to occur in the action area (**Figure 1-1**). This BA also analyzes Project effects to species that are part of experimental, non-essential (EXP/NE) populations. These EXP/NE species are treated as species proposed for federal listing for the purpose of conferencing under Section 7 of the ESA. A single candidate species, the greater sage-grouse, has been included in the BA for informational purposes only and no determination of effect has been provided for this species. AECOM is the third-party contractor for the EIS and serves as the designated non-federal representative responsible for preparing this BA on behalf of the BLM, Western, and the USFS.

Under provisions of the ESA, federal agencies are directed to conserve threatened and endangered species and the habitats in which these species are found. Federal agencies also are required to ensure actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of endangered and threatened species or their critical habitat. To this end, the action agencies are currently engaged in a number of conservation programs for listed species. For instance, per Section 7(a)(1) of ESA and BLM's Special Status Species Manual 6840, BLM is responsible for implementing conservation strategies as contained in approved recovery plans, cooperative agreements, and other instruments of which the BLM has cooperatively participated in developing. Examples include participation in and implementation of recovery actions as identified in recovery plans for the black-footed ferret, whooping crane, Mojave population of the desert tortoise, and the Utah prairie dog; and conservation agreements for the Bonneville cutthroat trout and Colorado River cutthroat trout.

Western's mission is to market and deliver clean, renewable, reliable, cost-based federal hydroelectric power and related services. Western is one of four power marketing administrations within the U.S. Department of Energy (DOE) whose role is to market and transmit wholesale electricity from multi-use water projects. Western’s service area encompasses a 15-state region of the central and western U.S. where Western’s more than 17,000 circuit mile transmission system carries electricity from 56 hydropower plants. Western sells its power to preference customers such as federal and state agencies, cities and towns, rural electric cooperatives, public utility districts, irrigation districts and Native American tribes. These entities, in turn, provide retail electric service to millions of consumers in the West.



Proposed Action
Ground Electrode Siting Area
Ground Electrode Overhead Electrical Line

TRANSWEST EXPRESS TRANSMISSION PROJECT

Figure 1-1
Project Location

0 20 40 80 Miles
0 20 40 80 km
1:4,750,000

N

Western AREA POWER ADMINISTRATION

Exported On: 2/27/2015

K:\Projects_4\TransWestExpress\12907_003_Transwest_Express\Figures\DocumentFigures\2015_BA_v2\GeneralFigures\Fig_01_01_ProjLoc.mxd

As Western's mission is primary based on the hydroelectric generation in the west, most of Western's actions under the Section 7(a)(1) of the ESA are focused on implementing conservation strategies as contained in the approved recovery plans and cooperative agreements of the major rivers that provide the renewable energy of Western's mission. The primary programs Western participates in, and extensively funds, include the:

- Missouri River Recovery Program. Western is a member of the Missouri River Recovery Implementation Committee which serves as a basin-wide collaborative forum to come together and develop a shared vision and comprehensive plan for Missouri River recovery, including the recovery of ESA listed species.
- Upper Colorado River Endangered Fish Recovery Program. This program is focused on recovering four species of endangered fish in the Colorado River and its tributaries in Colorado, Utah, and Wyoming. The program works for these species while still ensuring that water use and development continues to meet human needs in compliance with interstate compacts and applicable federal and state laws. Substantial funding for the program is provided by Western.
- Glen Canyon Dam Adaptive Management Program. This program is focused on mitigating the impacts of Glen Canyon dam on downstream resources, in particular ESA listed species affected by dam operations and other native species. This is an ongoing program primarily within Grand Canyon and Glen Canyon National Parks. Funding for the majority of the program is provided by Western.
- Lower Colorado River Multi-Species Conservation Program. This is a 50-year and $626 million dollar multi-stakeholder Federal and non-Federal partnership responding to the need to balance the use of lower Colorado River water resources and the conservation of native species and their habitats in compliance with the ESA.
- The Central Valley Project Improvement Act. This act mandates changes in management of the Central Valley Project, located in California, particularly for the protection, restoration, and enhancement of fish and wildlife. Since 1992, power customers have contributed more than $300 million for projects that include water temperature control devices at dams to regulate downstream water temperature and improve fish populations; installation of fish screens at intakes to improve fish passage; firm water supplies for Central Valley wildlife refuges, as well as other actions.

Western also works with the USFWS, as well as state wildlife agencies, through various recovery plans and agreements to ensure that the overhead wires that transmit the electricity generated from these hydroelectric facilities are not an additional risk to ESA listed species.

The USFS pursues conservation actions focused on addressing identified threats to species with status under the ESA. Conservation emphasis includes species relevant to the Project action area including Canada lynx, wolverine, Mexican spotted owl, yellow-billed cuckoo, greater sage-grouse (sage-grouse), Colorado pikeminnow, humpback chub, Colorado cutthroat trout, and other fishes of the upper Green River. Many of the programs associated with these species have been in place for several years, are fairly well recognized, and include Section 7 conference and consultation with the USFWS on relevant proposed management actions. Of recent and more specific note, the USFS is focusing on sage-grouse. The following areas are currently receiving considerable effort:

- The USFS is a partner to the BLM lead agency Greater Sage-grouse Management Plan effort. This document, when approved, will provide guidance to land managers regarding resource management within occupied sage-grouse habitat and range. The document will attempt to address the threats to sage-grouse identified in the USFWS 2010 decision.
- The USFS also is participating with state wildlife agencies in baseline studies to identify and refine sage-grouse habitats and use. USFS involvement has included cooperative funding and field support of local telemetry monitoring projects.

- On-the-ground land management efforts are focused upon reducing immediate threats to sage-grouse habitat. These include local and landscape scale efforts to maintain and enhance sagebrush community expanse and condition quality. Examples of projects include invasive pinyon and juniper removal from sagebrush communities and identifying, removing, or visually marking fences near sage-grouse leks to reduce bird-fence collisions.
- The USFS also works with State wildlife agencies to monitor lek attendance trends and other relevant sage-grouse observations.

The ESA requires action agencies to consult or confer with the USFWS and/or National Marine Fisheries Service (NMFS) when there is discretionary federal involvement or control over the action. Formal consultation becomes necessary when the action agency determines that the proposed action is likely to adversely affect listed species or critical habitat, or when the USFWS or NMFS do not concur with the action agency's finding (USFWS and NMFS 1998). Preparation of a BA is required under Section 7(c) of the ESA if listed species or their critical habitat may be present in the area affected by any major construction activities.

This BA provides documentation for the Proposed Action to meet federal requirements and agreements set forth among the federal agencies listed above. It addresses federally listed threatened, endangered, candidate, and proposed species and has been prepared pursuant to Section 7 regulations, in accordance with the 1998 procedures set forth by USFWS and NMFS, and in accordance with the 1994 Memorandum of Understanding (MOU) and 2000 Memorandum of Agreement (MOA). As part of this BA, the BLM, Western, and USFS request formal Section 7 consultation with the USFWS for the Project. The action agencies also request USFWS concurrence with the determinations made in this BA.

It should be noted that, during the Section 7 consultation process the applicant, TransWest Express LLC (TransWest), is prohibited from making any irreversible or irretrievable commitments of resources that would preclude the development of reasonable and prudent alternatives designed to avoid or minimize adverse effects on listed species. Prohibited actions include those that would directly or indirectly affect listed or proposed species and their habitats. TransWest is not prohibited from making other types of resource commitments that do not affect listed species or their habitats such as securing land leases and rights-of-way (ROWs) across private fee lands or purchasing equipment that would be used for the Project. However, prior to issuance of the ROD, such commitments would be considered at-risk.

ESA Section 7 consultation for the Project would need to be re-initiated under the following conditions: 1) if new information obtained through species-specific surveys or detailed siting/engineering reveals that the Proposed Action would affect listed or proposed species or designated or proposed critical habitat in a manner or to an extent not analyzed in the BA; 2) if the action is subsequently modified in a manner that causes an effect to a listed or proposed species or designated or proposed critical habitat that was not considered in the BA; 3) if a new species is listed or critical habitat is designated that may be affected by the Project; and/or 4) if the authorizing officer approves any other Final EIS alternative (or portion thereof) that differs from the Proposed Action analyzed in this BA.

1.2 Project Overview

In April 2010, TransWest Express LLC (TransWest/Applicant) and Western entered into a MOU in which Western agreed to act as joint lead agency with the BLM in preparation of an EIS for the proposed Project. In its route between its northern terminus near Sinclair, Wyoming, to its southern terminus in the Eldorado Valley south of Boulder City, Nevada, the proposed transmission line corridor would pass through BLM lands under the jurisdiction of multiple field offices (FOs) in Wyoming, Colorado, Utah, and Nevada. Based on the results of the EIS, the BLM will decide whether or not to grant a ROW for the Project across BLM-administered lands and Western will decide whether or not to use its federal borrowing authority to contribute financing and hold partial ownership in the transmission facilities and capacity. The USFS is a cooperating agency on the Project and is considered an action agency for the purposes of Section 7 consultation because portions of the Proposed Action would pass through or

immediately adjacent to three national forests in Utah: the Ashley, Uinta-Wasatch-Cache, and Manti-La National Forests. The USFS will decide whether or not to grant a special use permit for those crossings of National Forest System (NFS) lands. For more details on the lead and cooperating agencies' pending decisions along with their statements of purpose and needs for the Project, please refer to Section 1.1 of the EIS.

TWE is proposed as a 600-kilovolt (kV), DC transmission system extending from south-central Wyoming to southern Nevada (**Figure 1-1**). The Project would provide the transmission infrastructure and capacity necessary to deliver approximately 3,000 megawatts (MW) of electric power from renewable and/or non-renewable energy sources in south-central Wyoming to southern Nevada.

The Proposed Action would consist of the following facilities:

- Transmission Line – The 600-kV DC transmission line would extend approximately 728 miles across public (federal and state) and private lands in Wyoming, Colorado, Utah, and Nevada. The transmission line corridor would range in width from approximately 500 to 3,600 feet. The transmission line ROW would be approximately 250 feet wide.
- Terminals – Terminal stations would be located on private or public lands at the two ends of the transmission line. The northern terminal would be located near Sinclair, Wyoming, and the southern terminal would be located at the Marketplace Hub in the Eldorado Valley near Boulder City, Nevada. Terminal facilities would include converter stations and related substation facilities necessary for interconnections to existing and planned regional alternating current (AC) transmission systems.
  - Facilities within the Northern Terminal Station would be situated on approximately 235 acres and include an AC/DC converter station to convert alternating electrical current to direct current, thereby allowing power from the AC system to be transmitted on the Project transmission system.
  - Facilities within the Southern Terminal Station would be situated on approximately 205 acres and include an AC/DC converter station to convert direct current to alternating current, allowing power transmitted on the Project transmission system to enter the regional grid serving California, Nevada, and Arizona. The Project also would be capable of transmitting power in a south-to-north direction, although the primary purpose of the transmission line would be for north-to-south power transfers.
- Access Roads – Access roads would include new overland access, new unpaved roads, and improvements on existing roads to access construction areas and Project facilities during operation and maintenance phases.
- Ancillary Facilities, Communication Systems – A network of 12 to 15 fiber optic communication and regeneration sites would be located within the 250-foot-wide transmission line ROW. Microwave facilities also would be located at each of the terminals.
- Ancillary Facilities, Ground Electrodes – Ground electrode facilities are required to provide an electrical circuit through the ground to maintain system operations following emergency events when there is an unexpected loss of one of the two poles (or circuits) of the Project terminal or converter station equipment. There would be two ground electrode facilities, each sited on approximately 160 acres of private land within 100 miles of the northern and southern terminals in Wyoming and Nevada. Each of the facilities would result in a total of 65 acres of ground disturbance during construction, the majority of which would be reclaimed following construction. Long-term surface disturbance associated with ground electrode facilities during the operation phase of the Project would total approximately 6 acres. A low voltage 34.5-kV electrical line would connect the ground electrode facilities to the transmission line.

The description of the Proposed Action presented in this BA was summarized from information contained in Chapter 2.0 of the Final EIS and the Project Plan of Development (POD), which is presented in Appendix D of the Final EIS. Refer to these documents for a more detailed description of the proposed Project.

1.3 Species Considered in the Analysis

Based on a letter from the USFWS dated August 25, 2010, a list of federally threatened, endangered, candidate, and proposed species for which 12-month findings were pending was provided to the BLM for the proposed Project area. In total, 39 listed species, 7 candidate species, and 1 species proposed for listing were identified. This total included four federally listed species known to occur in or along the Platte River that could be affected by Project-related water withdrawals from the North Platte River Basin in Wyoming.

After this initial list of species was identified, a detailed review of species occurrence information was completed for the Proposed Action. Data sources included Natural Heritage Program databases for the states of Wyoming, Colorado, Utah, and Nevada; published literature on species distributions; and feedback from federal and state agency biologists who participated in the Project's Biological Resources Task Group (BRTG). The BRTG participants coordinated with other agency biologists having knowledge of listed species occurrence for the Project action area. Following identification of the agency-preferred alternative, AECOM refined the list of species to be carried forward in the BA based on a review of species-specific occurrence data and habitat characteristics along the alignment of this alternative. Through this process, each of the species identified in the USFWS' 2010 letter was either carried forward for or eliminated from detailed analysis in the BA. A species screening matrix was developed and used to document this process. This screening matrix was presented to the USFWS in a meeting on January 21, 2014. On February 21, 2014, the USFWS issued a letter confirming the list of species to be analyzed in the TransWest BA. Following a change in the agency-preferred alternative in September of 2014, the species with potential to be affected by the Proposed Action analyzed in this BA changed. A revised species list was submitted to the USFWS on October 27, 2014 and the USFWS concurred with the changes and provided additional changes on October 31, 2014. Federally listed, candidate, and EXP/NE species (treated as proposed species for conferencing purposes) carried forward for detailed analysis in this BA are presented in **Table 1-1**. Several listed, one EXP/NE, and one candidate species occur in the counties traversed by the Proposed Action. Not all of these species would be affected by Project implementation. Species not affected by the Project are not discussed further in this document.

In total, 25 species are analyzed in this BA. Seven of these species would only have potential to be affected by Project-related water depletions in the Platte and Colorado River Basins. These species include the pallid sturgeon, whooping crane, interior least tern, piping plover, and western prairie fringed orchid in the Platte River Basin and the bonytail and humpback chub in the Colorado River Basin. For species with potential to be directly or indirectly affected by Project construction, operation, and management, species-specific information, including the environmental baseline, assessment of Project effects, and determinations of effect, are provided in Chapter 6.0 of this BA. The Platte River species, which only have potential to be indirectly affected by the Project through water depletions in the North Platte River system, are discussed in Section 6.4 of this BA.

Table 1-1 List of Endangered, Threatened, Proposed, and Candidate Species Carried Forward in the Biological Assessment

Common Name	Scientific Name	Federal Status	Proposed or Designated Critical Habitat (Y/N)	Recovery Plan (Y/N)
Mammals				
Black-footed ferret	*Mustela nigripes*	EXP/NE	N	Y
Canada lynx	*Lynx canadensis*	Threatened	Y	Outline
Gray wolf	*Canis lupus*	EXP/NE in Wyoming; Endangered in Colorado and Utah	N	N
Utah prairie dog	*Cynomys parvidens*	Threatened	N	Y
Birds				
California condor	*Gymnogyps californianus*	Endangered; EXP/NE-Utah	Y	Y
Greater sage-grouse	*Centrocercus urophasianus*	Candidate	N	N
Yuma clapper rail	*Rallus longirostris yumanensis*	Endangered	N	Draft
Whooping crane[1]	*Grus americana*	Endangered	Y	Y
Piping plover[1]	*Charadrius melodus*	Threatened	Y	Y
Interior least tern[1]	*Sternula antillarum*	Endangered	N	Y
Yellow-billed cuckoo (western)	*Coccyzus americanus*	Threatened	Y	N
Southwestern willow flycatcher	*Empidonax traillii extimus*	Endangered	Y	Y
Reptiles and Amphibians				
Desert tortoise	*Gopherus agassizii*	Threatened	Y	Y
Fish				
Bonytail[2]	*Gila elegans*	Endangered	Y	Y
Colorado pikeminnow	*Ptychocheilus lucius*	Endangered	Y	Y
Humpback chub[2]	*Gila cypha*	Endangered	Y	Y
June sucker	*Chasmistes liorus*	Endangered	Y	Y
Pallid sturgeon[1]	*Scaphirhynchus antillarum*	Endangered	N[3]	Y
Razorback sucker	*Xyrauchen texanus*	Endangered	Y	Y
Virgin River chub	*Gila robusta seminuda*	Endangered	N[3]	N[4]

Table 1-1 List of Endangered, Threatened, Proposed, and Candidate Species Carried Forward in the Biological Assessment

Common Name	Scientific Name	Federal Status	Proposed or Designated Critical Habitat (Y/N)	Recovery Plan (Y/N)
Plants				
Barneby ridgecress	*Lepidium barnebyanum*	Endangered	N	Y
Deseret milkvetch	*Astragalus desereticus*	Threatened	N	N
Clay phacelia	*Phacelia argillacea*	Endangered	N	Y
Western prairie fringed orchid[1]	*Platanthera praeclara*	Threatened	N	Y
Ute ladies'-tresses orchid	*Spiranthes diluvialis*	Threatened	N	Draft

[1] Species with potential to be affected only by water depletions in the Platte River System.

[2] Species with potential to be affected only by water depletions in the Colorado River System.

[3] No critical habitat within the action area.

[4] Recovery plan is not applicable to the Muddy River population.

1

2

2.0 Project Description

2.1 Project Location

As summarized in Section 1.2 of this BA and described in detail in Sections 2.4.2 and 2.5.1 of the EIS, the Proposed Action (identified as the Agency Preferred Alternative in the EIS) would extend from a northern terminus near Sinclair, Wyoming, to a southern terminus in the Eldorado Valley, approximately 12 miles southwest of Boulder City, Nevada. For each region, the Proposed Action has been chosen based on multiple criteria including, but not limited to, staying within or adjacent to existing utility corridors, avoiding or minimizing impacts to sensitive natural and cultural resources, and accommodating input from local governments and agency representatives. Please refer to the EIS for detailed narrative descriptions of the Project components.

To facilitate the analysis of alternatives in the EIS, the Project area was broken into four geographic regions. Region I encompasses the Wyoming and Colorado portions of the line, Region II extends from the Colorado-Utah border to Delta, Utah. Region III is located between Delta and a point approximately 20 miles northeast of Las Vegas, Nevada; and Region IV extends from that point to the southern terminus of the proposed line. As a whole, the Proposed Action is made up of four regional alternatives (denoted alphanumerically by the region number in Roman numerals followed by the alpha code of the alternative in that region) comprising the agency preferred alternative from the EIS. These regional alternatives and other Project components are listed in **Table 2-1** and shown in **Figures 2-1** through **2-4**. Following Table 2-1, the regional alternatives comprising the Proposed Action are not referred to by their alphanumeric codes but are simply identified by Project region as this BA only evaluates a single Proposed Action and does not assess alternatives to that action.

Tables 2-2 through **2-6** summarize the lengths and areas of disturbance for each of the Project components during construction and operation of the facilities. Construction impacts take into account short-term surface disturbance associated with clearing and grading around facility sites and temporary use areas such as structure work areas, concrete batch plants, material storage yards, and wire pulling and tensioning sites. Following construction, the majority of these areas would be reclaimed and revegetated and only the facility footprints would remain as disturbed ground. Thus, long-term operation-related impacts are substantially lower than construction-related impacts as a result of interim reclamation efforts. Refer to **Figure 2-5** for a schematic representation of a typical transmission line ROW with temporary work areas and access roads.

Table 2-1 Proposed Action

Project Components	Component Description
Transmission line analysis corridors[1]	Regional transmission line alternatives: I-B, II-G, III-D, and IV-A
Ground electrode facilities	Bolten Ranch and Halfway Wash East ground electrode sites
Terminals	Northern and Southern Terminals

[1] Roman numeral designates the geographical region and the letter denotes the alternative that comprises the Proposed Action in that region.

Table 2-2 Project Properties and Transmission Line Facility Areas

Electrical Properties					
Nominal Voltage	±600-kV DC				
Nominal Capacity	3,000 MW (as measured at the Southern Terminal)				
Circuit Configuration	DC Bi-Pole Bundled				
Conductor Size	Approximately 1.5-inch-diameter aluminum conductor steel reinforced (ACSR) bundled with three or four subconductors per pole				
Conductor Ground Clearance	37 feet minimum at a conductor temperature of 176 degrees Fahrenheit				
Facility Properties					
Line Length	728 miles				
ROW Width	250 feet; Increased ROW may be required in site-specific locations to accommodate rough terrain or unusually long spans				
Access Roads	Paved Roads	Typically highways and state routes; used for travel to existing and new dirt roads for ROW access			
	Dirt/Gravel Roads (no improvement)	No improvement to dirt/gravel roads required			
	Dirt Road (with improvements)	Improvement of existing dirt roads 16 to 24 feet wide depending on terrain			
	New Access Road (bladed)	Typically, 14-foot-wide bladed surface with 2- to 3-foot-wide berms or ditches on either side, but can be wider in steep and mountainous terrain because of cut and fill requirements according to ground slope			
	Overland Access	Non-graded overland access (“drive and crush”) where terrain and soil conditions are suitable			
Structure Designs[1]	**Type**	**Application**	**Interval (Span)**	**Height**	**Foundation**
	Guyed steel lattice (tangent)	Flat to rolling terrain, open areas	3 to 4 structures per mi (900-1,500 feet)	120-180 feet	One 3- to 6-foot dia, 4 to 6 feet deep precast concrete support pedestal; four anchors for guy cables designed for soil/rock conditions
	Self-supporting steel lattice (tangent)	Steep terrain with side hills, agriculture, and urban areas	3 to 4 structures per mi (900-1,500 feet)	120-180 feet	Four 3- to 4-foot dia, 12 to 25 feet deep reinforced cast-in-place concrete
	Tubular steel poles (tangent)	Urban and other highly constrained areas	5 to 6 structures per mi (700-1,200 feet)	100-150 feet	One 6- to 10-foot dia, 20 to 60 feet deep reinforced cast-in-place concrete
	Self-supporting steel lattice (angle)	Angles 2° or less	site-specific	120-140 feet	Four 5- to 8-foot dia, 20 to 50 feet deep reinforced cast-in-place concrete drilled pier
	Self-supporting steel lattice (dead-end)	Angles from 3°-90° or every 4-6 mi on straight runs	site-specific	120-140 feet	Four 5- to 8-foot dia, 20 to 50 feet deep reinforced cast-in-place concrete drilled pier

Table 2-2 Project Properties and Transmission Line Facility Areas

Land Disturbance			
Construction Areas	**Type**	**Footprint[2]**	**Interval**
Structure Work Areas	All Tower Structures	ROW width x 200 feet (50,000 sq feet)	each structure location
Wire-Pulling and Tensioning Sites	Mid-span conductor and shield wire	ROW width x 500 feet (125,000 sq feet)	9,000 feet (approx.)
	Dead-end structures	ROW width x 500 feet (125,000 sq feet)	two sites at all dead-end structures
	Communication fiber optic cable	100 x 500 feet (50,000 sq feet)	18,000 feet (approx.)
Staging Areas/Fly Yards		7 ac (approx.) outside ROW	5 mi (approx.)
Material Storage Yards		20 ac (approx.) outside ROW	30 mi (approx.)
Batch Plant Sites		5 ac (approx. stand-alone) outside ROW	15 mi (approx.)
Guard Structures		100 x 100 feet (10,000 sq feet)	each road and existing electrical line crossings
Operation Areas	**Type**	**Footprint[2]**	**Interval**
Structure Bases[1]	Guyed steel lattice (tangent)	10- x 10-foot mast foundation; four 10- x 10-foot anchors (500 sq feet total)	3 to 4 areas per mi
	Self-supporting steel lattice (tangent)	30 x 30 feet (900 sq feet)	3 to 4 areas per mi
	Tubular steel poles (tangent)	7-foot-dia (40 sq feet)	5 to 6 areas per mi
	Self-supporting steel lattice (angle)	35 x 35 feet (1,225 sq feet)	Angles 2° or less
	Self-supporting steel lattice (dead-end)	40 x 40 feet (1,600 sq feet)	Angles from 3°-90° or every 4 to 6 mi on long straight runs
Communication Regeneration Sites		100 x 100 (10,000 sq feet)	50 mi (approx.)

[1] Structure types to be used in site-specific settings will be determined during engineering and design of the agency preferred alternative.

[2] Footprint areas within ROW unless specified otherwise.

Table 2-3 Length of Proposed Transmission Line Route and Associated Access Roads

Facilities	Length (miles)				
	Region I	Region II	Region III	Region IV	TOTAL
Transmission Line	158	252	281	37	**728**
Access Roads	204	395	303	49	**951**

Table 2-4 Proposed Action Areas of Disturbance

Facilities	Construction Disturbance (acres)				Operation Disturbance (acres)			
	Region I	Region II	Region III	Region IV	Region I	Region II	Region III	Region IV
Access Roads	456	990	638	120	456	990	638	120
Structures and Communication Sites	746	1,181	1,303	177	15	24	27	4
Stringing and Tensioning Sites	520	927	884	161	–	–	–	–
Temporary Work Areas[1]	379	604	675	89	–	–	–	–
Facilities Total	**2,101**	**3,703**	**3,500**	**547**	**471**	**1,014**	**665**	**124**
Additional ROW-vegetation clearing[2]	3,310	5,250	6,089	771	–	–	–	–

[1] Temporary work areas include staging areas, concrete batch plants, storage yards, and helicopter fly yards.

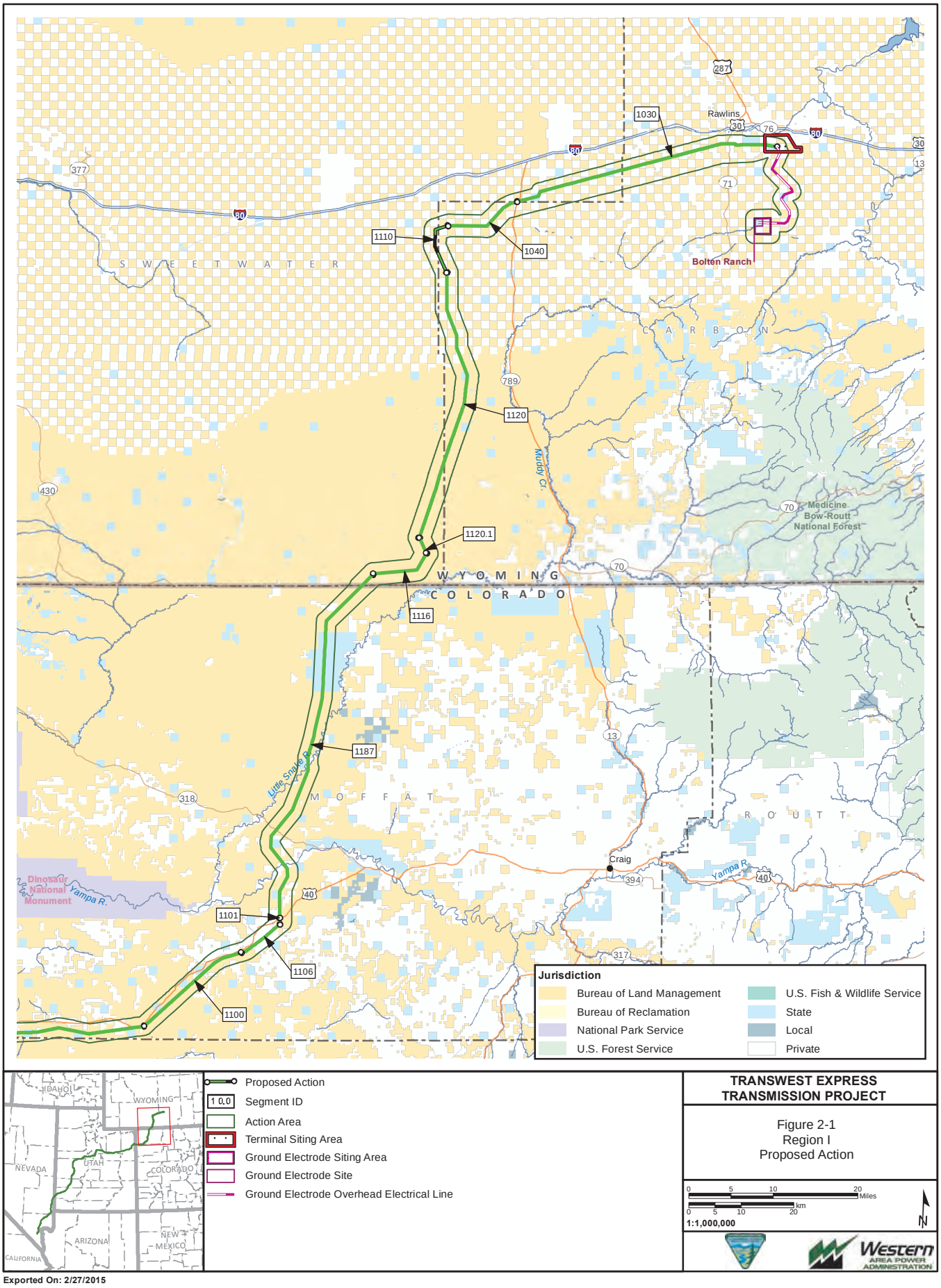
[2] Additional ROW-vegetation clearing is the remainder of the area within the ROW that is not included in construction or operation facilities disturbance that may experience some degree of vegetation clearing (e.g., mowing, woody vegetation clearing, and overland travel) during construction.

Table 2-5 Proposed Action Ground Electrode System Lengths and Areas of Disturbance

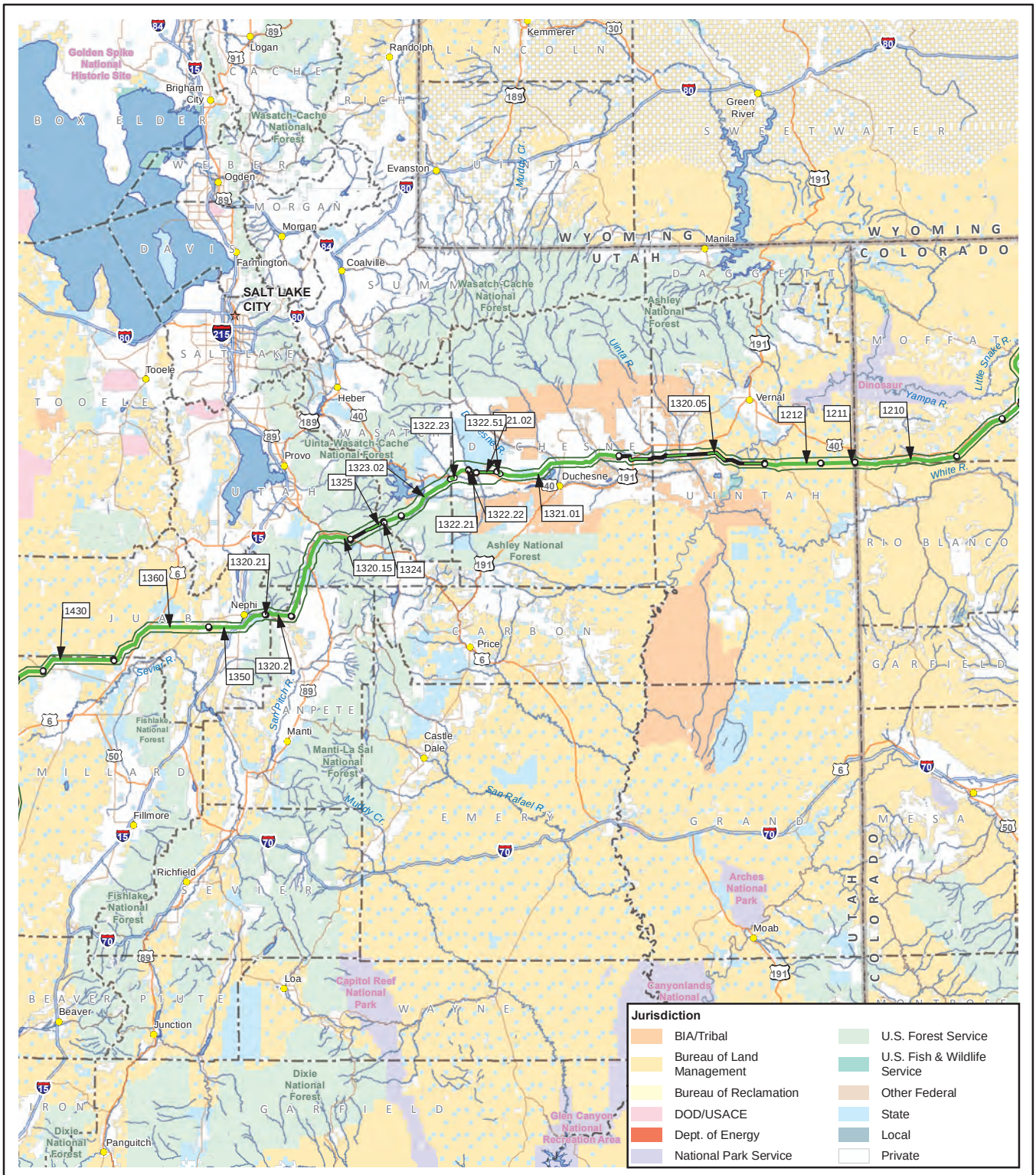
Ground Electrode System Sites	Length (miles)		Construction Disturbance (acres)				Operation Disturbance (acres)			
	34.5-kV AC Overhead Line	Access Road	Ground Electrode Sites	Over-head Lines	Access Roads	Total	Ground Electrode Sites	Over-head Lines	Access Roads	Total
Bolten Ranch	15	21	65	40	46	151	6	<1	46	52
Halfway Wash East	4	5	65	18	18	**101**	6	<1	18	**24**

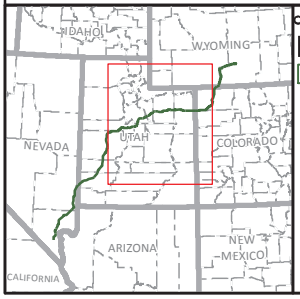
Table 2-6 Terminal Facility Lengths and Areas of Disturbance

Terminal	Length (miles)		Construction Disturbance (acres)				Operation Disturbance (acres)			
	Inter-connection T-Lines	Access Roads	Converter, Substation, Switchyard	Inter-connection T-Lines	Access Roads	Total	Converter, Substation, Switchyard	Inter-connection T-Lines	Access Roads	Total
Northern	13	17	213	263	43	519	205	1	43	249
Southern	10	34	148	328	81	557	140	5	81	226
Southern Alternative	19	47	148	496	111	755	140	9	111	260



Exported On: 2/27/2015





Proposed Action
1 0.0 Segment ID
Action Area

TRANSWEST EXPRESS TRANSMISSION PROJECT

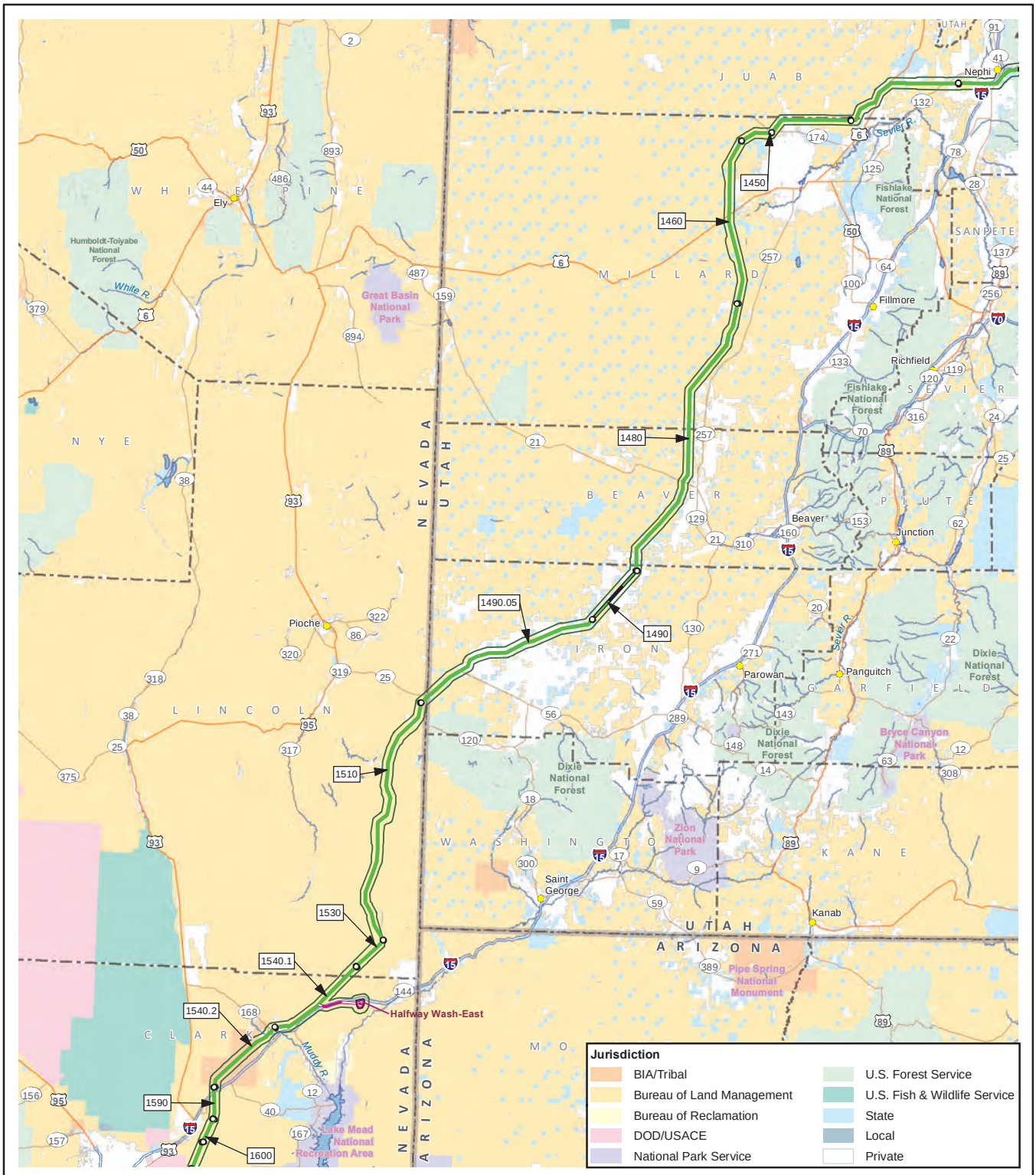
Figure 2-2
Region II
Porposed Action

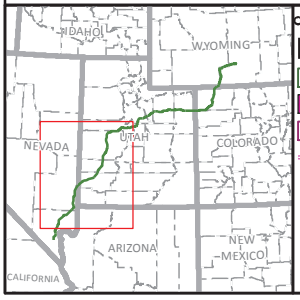
0 10 20 40 Miles
0 10 20 40 km
1:2,250,000

Western AREA POWER ADMINISTRATION

Exported On: 2/27/2015

K:\Projects_4\TransWestExpress\12907_003_Transwest_Express\Figures\DocumentFigures\2015_BA_v2\GeneralFigures\Fig_02_02_SRII_APA.mxd





Proposed Action
1 0.0 Segment ID
Action Area
Ground Electrode Siting Area
Ground Electrode Site
Ground Electrode Overhead Electrical Line

TRANSWEST EXPRESS TRANSMISSION PROJECT

Figure 2-3
Region III
Proposed Action

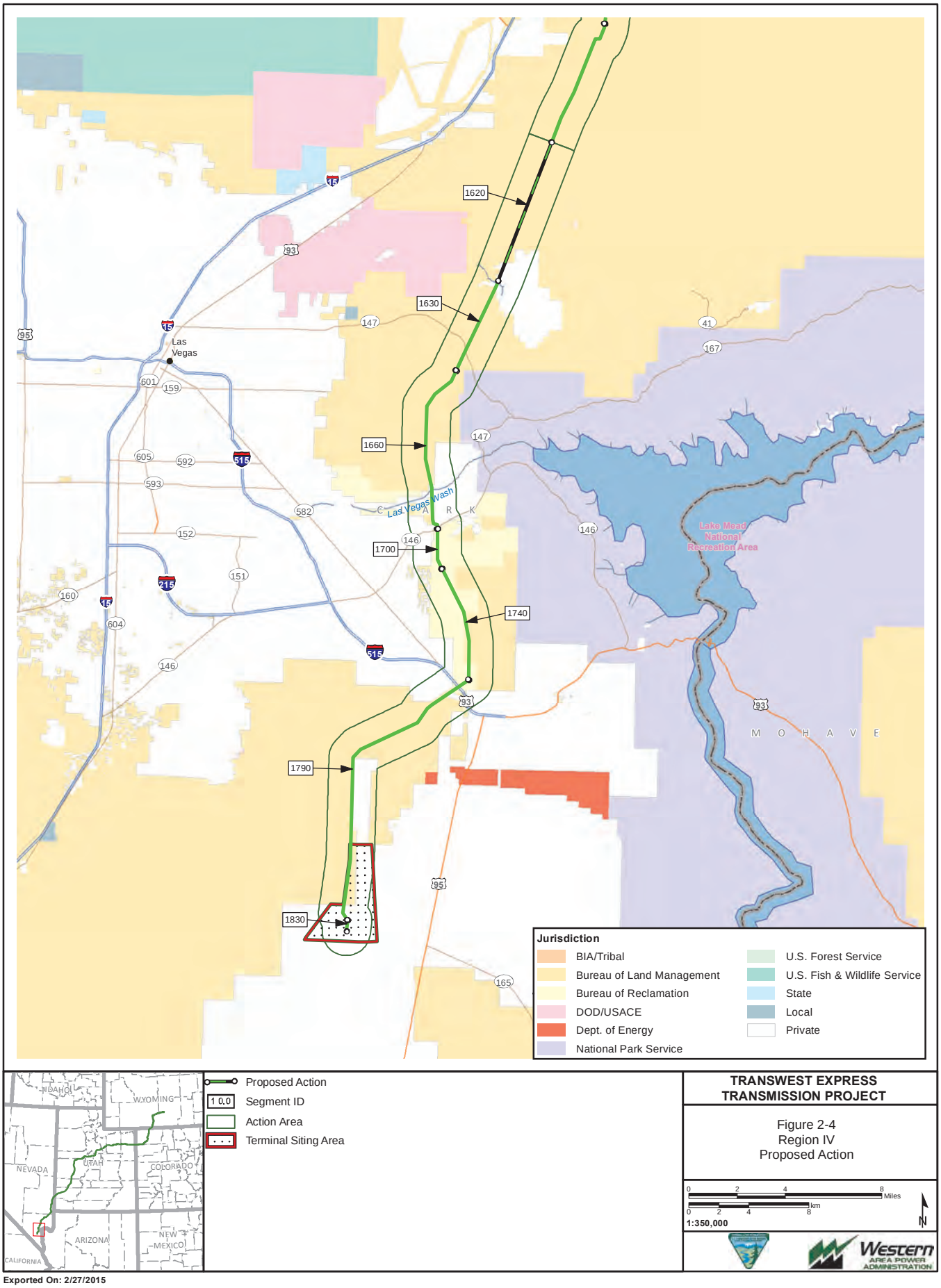
0 10 20 40 Miles
0 10 20 40 km
1:2,000,000

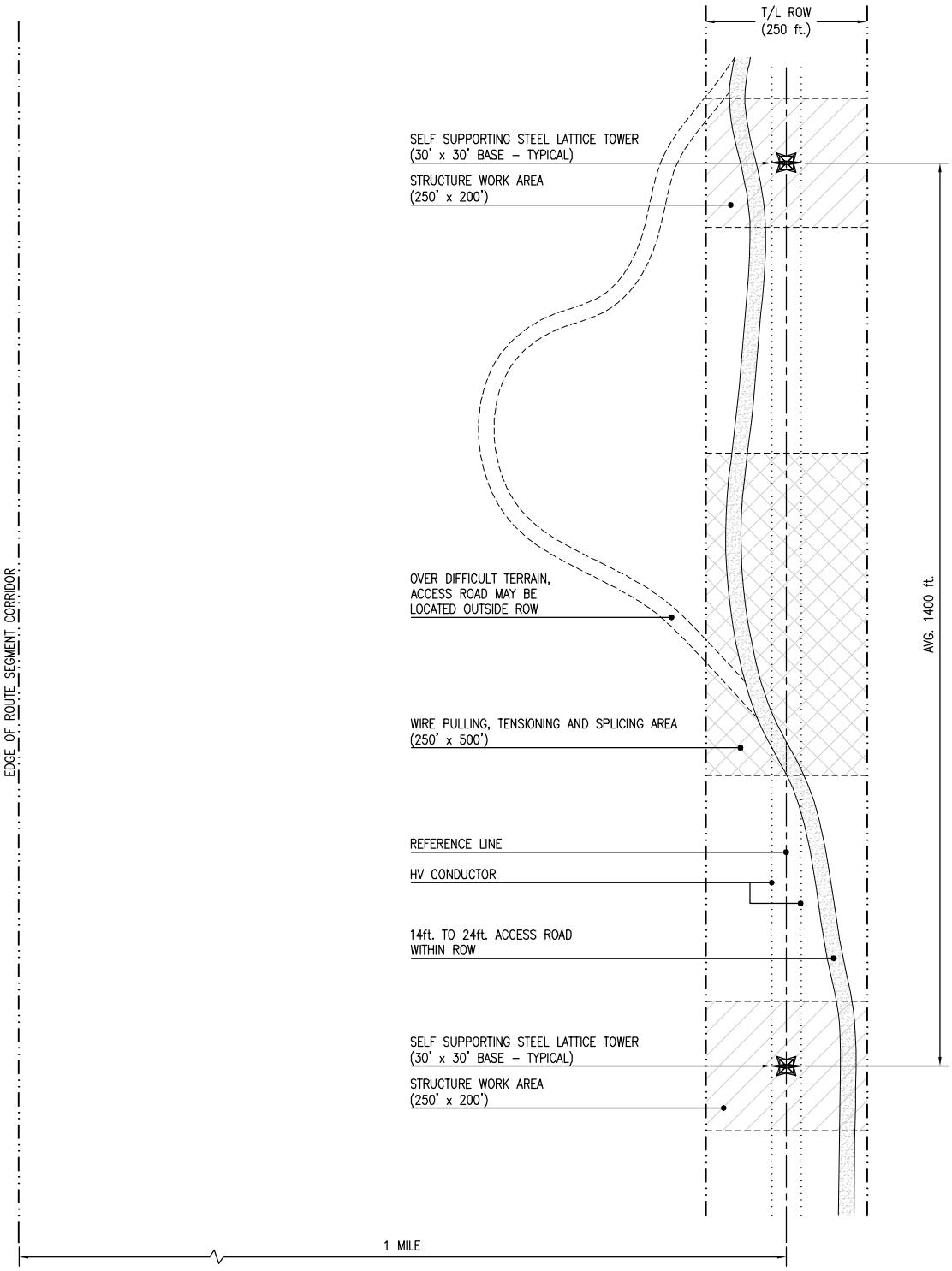
N

Western AREA POWER ADMINISTRATION

Exported On: 2/27/2015

K:\Projects_4\TransWestExpress\12907_003_Transwest_Express\Figures\DocumentFigures\2015_BA_v2\GeneralFigures\Fig_02_03_SRIII_APA.mxd


K:\Projects_4\TransWestExpress\12907_003_Transwest_Express\Figures\DocumentFigures\2015_BA_v2\GeneralFigures\Fig_02_04_SRIV_APA.mxd
1620
1630
1660
1700
1740
1790
1830
Las Vegas
Las Vegas Wash
Lake Mead National Recreation Area
M O H A V E
C A R K
Jurisdiction
BIA/Tribal
Bureau of Land Management
Bureau of Reclamation
DOD/USACE
Dept. of Energy
National Park Service
U.S. Forest Service
U.S. Fish & Wildlife Service
State
Local
Private
Proposed Action
1 0.0 Segment ID
Action Area
Terminal Siting Area
IDAHO
WYOMING
NEVADA
UTAH
COLORADO
ARIZONA
NEW MEXICO
CALIFORNIA
TRANSWEST EXPRESS TRANSMISSION PROJECT
Figure 2-4
Region IV
Proposed Action
0 2 4 8 Miles
0 2 4 8 km
1:350,000
N
Western AREA POWER ADMINISTRATION
Exported On: 2/27/2015



TRANSWEST EXPRESS TRANSMISSION PROJECT

Figure 2-5
Typical Transmission ROW
and
Temporary Work Areas

Source: TWE 2011

06/04/14

Note that there are two Design Options that could be applied to the Proposed Action depending on future permitting decisions for other regional systems and/or future energy and transmission market conditions. Under Design Option 2 the Project would deliver energy to a new Southern Terminal located near the Intermountain Power Project (IPP) just north of Delta, Utah, via a 600-kV, DC transmission line. Delivery of energy to markets in the Desert Southwest region would be completed through a new 500-kV AC line (constructed along the same alignment as the Proposed Action) as well as through the existing Southern Transmission System (STS) line between Delta, Utah, and Adelanto, California. Under Design Option 2, the Southern Terminal and ground electrode system located in Clark County, Nevada, would be replaced by similar facilities located near the IPP. The new 500-kV AC line from IPP to southern Nevada would deliver its energy to one of the existing substations in the Eldorado Valley and would include a series compensation station about midway between IPP and Eldorado Valley. Design Option 2 would be expected to reduce Project impacts to federally listed species due to the reduced footprint of Project facilities (i.e., elimination of the Southern Terminal and the Halfway Wash East ground electrode site) in desert tortoise habitat.

Under Design Option 3, the Project would be constructed using a two-phase approach. The first phase would entail constructing a 1,500-MW, 500-kV, three-phase AC transmission line from the proposed Northern Terminal near Sinclair, Wyoming, to the IPP substation near Delta, Utah. This phase also would include a series compensation station located about midway between Sinclair and IPP. Phase two would occur in the future if and when market demands warrant conversion of the line from 1,500-MW to 3,000-MW. At this point, the southern portion of the line would be constructed as a 600-kV DC line from the IPP to Marketplace Hub and the northern portion of the line would be converted from a 500-kV AC line to a 600-kV DC line with one of the three conductor bundle sets de-energized and left in place. If future market demands warrant construction of the southern portion of the transmission line, Design Option 3 would have essentially identical impacts on federally listed species as the Proposed Action but they would be initiated over a longer time period. If there is not sufficient demand for the southern portion of the transmission line, this design option would have fewer impacts to federally listed and candidate species due to the lack of new facilities in southwestern Utah and southern Nevada. Please refer to Section 2.1.2 of the EIS for more detailed information on these design options.

Design Options 2 and 3 currently do not meet the interests and objectives of the Project because capacity currently is not available on the STS. Therefore, implementation of the design options only would be considered if sufficient capacity (approximately 1,500-MW) became commercially available to transmit energy delivered by the Project to California, and if commercial interconnection agreements with the utility owning and operating the IPP transmission line (currently Los Angeles Department of Water and Power [LADWP]) could be established. Consequently, these design options will not be discussed further in this BA. Should the Project be approved and one of the design options selected by the Applicant, it may be necessary to revisit the Section 7 consultation for this project in order to address minor differences in Project effects on listed, proposed, and/or candidate species.

2.2 Action Area

As defined in the ESA Handbook (USFWS and NMFS 1998), a project “action area” refers to all areas that would be affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 Code of Federal Regulations [CFR] 402.02). The portion of action area for the proposed Project that would be directly affected by construction and operation of the Project includes the footprints for the Northern and Southern Terminals, the Bolten Ranch and Halfway Wash East ground electrode systems, and two areas associated with the transmission line route:

- The proposed 250-foot-wide transmission line ROW in which the preliminary engineered alignment is located; and
- The refined transmission corridor, which varies from 500 feet wide to 3,500 feet wide depending on local resource issues and siting constraints.

The indirect effects portion of the action area varies somewhat depending on the species and the type of project activity. In general, it consists of a 2-mile-wide corridor centered on the proposed ROW. For portions of the project that are not sited adjacent to existing utility lines, there could be some direct impacts in this area resulting from new access roads linking the ROW with the existing road network and from temporary work areas such as staging areas, concrete batch plants, storage yards, and helicopter fly yards. The exact locations of facilities within this "potential disturbance area" have not been determined at this time but have been accounted for in quantifying Project effects and would be very small relative to the total area within the 2-mile-wide corridor. Consequently, the potential disturbance area is used to account for indirect impacts to species carried forward in the BA. This area is buffered by varying amounts for different species (e.g., 300 feet for most listed plants, 4 miles for greater sage-grouse) to account for additional species-specific indirect impacts that would result from human activity and construction noise that could extend beyond this corridor. The action area for each species analyzed in this BA is defined in Chapter 6.0 under the species-specific Area of Analysis sections.

2.3 Proposed Action

The above tables summarize relevant aspects of the Proposed Action and are referred to, where appropriate in the subsections that follow. Refer to Chapter 2.0 and/or Appendix D (Preliminary POD) of the TWE Final EIS for additional details on the Proposed Action. **Table 2-2** provides the specifications of project components, including the widths of new access roads, dimensions of temporary work spaces, sizes and intervals of various types of transmission tower bases, and other information upon which the lengths and acreages of disturbance shown in **Tables 2-3** through **2-6** are based.

2.3.1 Pre-construction Activities

Prior to construction, TransWest would obtain all applicable federal, state, and local permits; acquire easements and ROW grants for the Project facilities; conduct pre-construction environmental and engineering surveys; and conduct geotechnical surveys and testing. Studies would be conducted to select structure sites based on engineering design criteria, terrain, geologic investigations, and property owner input regarding land use and how to minimize potential impacts to properties.

2.3.1.1 Environmental Surveys

As required by permitting agencies, pre-construction environmental surveys would be conducted for the identification, flagging, and avoidance of sensitive resources. Various environmental pre-construction surveys are identified in the Final EIS and are expected to be mandated by the agencies' decisions. Environmental surveys may include, but would not be limited to: special status plant and wildlife surveys, noxious weed surveys, wetlands delineations per Clean Water Act (CWA) Section 404 permit requirements, and cultural resource surveys. The results of all survey efforts pertaining to federally listed, EXP/NE, proposed, or candidate species would be provided to the USFWS and applicable land and wildlife management agencies, as appropriate, after such data are collected and compiled.

2.3.1.2 Engineering Surveys

Pre-construction engineering surveys would be conducted to identify the transmission line ROW centerline and width, structure sites, vegetation clearance boundaries, property boundaries, ground profiles, access routes, temporary work areas, and stream crossings.

2.3.1.3 Geotechnical Investigations

Geologic and geotechnical surveys would be completed at proposed and alternate structure locations to evaluate potential geologic and geotechnical hazards and to determine specific requirements (ground conditions, soil types, depth to rock, depth to water, soil strength properties, etc.) for foundation design and construction. The work would be completed in time to develop final engineering specifications necessary for construction. The primary purpose of the geologic evaluation is to identify potential hazards with sufficient lead time to evaluate options for avoiding or mitigating potential hazards. To

determine proper structure foundation requirements, geotechnical investigations would be performed in the field to evaluate the strength and bearing capacity of site soils. Both engineering and environmental surveys would be conducted to identify the ROW centerline and width, structure sites, vegetation clearance and property boundaries, access routes, temporary work areas, and sensitive resources. Surveys would be performed within the structure construction work areas and ROW after the ROW grant. Geotechnical investigations will not be initiated until after the Section 7 consultation process is complete.

2.3.2 Construction Activities

It is currently anticipated that the total construction timeframe for the Project would be approximately 3 years with construction of the terminals and ground electrode systems taking place concurrently with construction of the transmission line. The overall construction schedule for the transmission line has been separated into three construction spreads with a staggered start time to allow time for setups, material and equipment logistics, and coordination between spreads. The construction spreads are planned to be: 1) Northern Terminal to northeastern Utah; 2) northeastern Utah to west-central Utah; 3) west-central Utah to the Southern Terminal. Line construction would progress simultaneously in the three spreads. The duration of transmission line construction activities on any given parcel of land may extend up to 1 year, although the total amount of time of actual construction activity would be much shorter, likely on the order of a few months. Along any given section of the route, construction would be characterized by short periods (ranging from 1 day up to 2 weeks) of relatively intense activity interspersed with periods of no activity. Construction of the terminals would start approximately 3 to 6 months after the start of construction on the transmission line and would run concurrently for approximately 2 years. Construction activities for the main project components are described in the subsections below. Refer to Section 5.8.1 of the Project Plan of Development (POD) (Final EIS, Appendix D) for detailed information on the relative timing and duration of construction activities.

The total estimated number of construction personnel for construction of the entire transmission line is 630 people. For construction of the two terminals and two ground electrode systems, it is estimated that an additional 360 people would be needed. Construction would generally occur between 7 a.m. and 7 p.m., Monday through Saturday. However, additional hours may be necessary to make up for schedule delays or complete critical activities. Temporary work camps are not expected to be necessary for construction of the Project. Refer to POD Section 5.8.2 for detailed information on the size of the various construction crews and the type and quantity of equipment that would be used in constructing the transmission line and ancillary facilities.

2.3.2.1 Transmission Line

As shown in **Table 2-2** and **Table 2-3**, the total length of the Proposed Action would be approximately 728 miles. The general sequence of transmission line construction includes: construction of access roads; clearing of the ROW and temporary work areas; installation of tower foundations; assembly and erection of structures; installation of shield wires and conductors; construction of ancillary facilities; and site cleanup and reclamation of temporary use sites. The following information provides a general description of the construction activities for the major transmission line components. More detailed descriptions of these activities may be found in Section 2.4.2 of the Final EIS and Section 3.5.2 of the Project Description Technical Report located in Appendix D of the Draft EIS.

Access Roads

The estimated lengths of the access roads associated with the Proposed Action in the four geographical regions would be approximately 204 miles in Region I, 395 miles in Region II, 303 miles in Region III, and 49 miles in Region IV. The total length of the transmission line access roads would be approximately 951 miles (**Table 2-3**). The estimated area of disturbance for these roads is 2,447 acres (**Table 2-4**). The location of the access roads has not been defined at this time. However, all new roads would be located within 1 mile of the preliminary engineered alignment (i.e., within a 2-mile-wide corridor centered on the

transmission line). The following information provides a description of the design and construction of the TWE access roads.

The Project would require some form of surface access to all structures and work areas during construction and operation to allow equipment to access each transmission structure. The construction of new access roads would occur only as necessary to access structure sites lacking direct access from existing roads, or where topographic conditions (e.g., steep terrain, rocky outcrops, and drainages) prohibit safe overland access to the site. Where terrain and soil conditions are suitable, non-graded overland access ("drive and crush") would be employed. New access roads would be located within the Project ROW whenever practical and would be sited to minimize environmental impacts. The number of new access roads would be held to a minimum, consistent with their intended use (e.g., structure construction or conductor stringing and tensioning).

Where new roads are required, access roads would be designed in accordance with standards and guidelines set by the American Association of State Highway and Transportation Officials (AASHTO). On public lands, BLM and USFS road design standards would be followed, including standards set forth in "The Gold Book – Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development" (AASHTO 2006).

Existing, maintained roads would comprise the backbone road network. These roads were identified and analyzed in the EIS. As indicated above, new or improved access road locations would not be determined until after the ROD is issued, an action alternative is approved, and the final engineering design is completed prior to any notice to proceed with construction being issued. For assessment in the TWE EIS, a programmatic methodology was developed to estimate miles of new access roads, differentiating between required access roads both inside and outside the refined transmission corridor. Four terrain types (flat, rolling, steep, and mountainous) were considered in determining different road improvement needs along the routes. The methodology used the results obtained from 18 example segments and the slope of the 250-foot-wide transmission line ROW within these segments to estimate miles of new access roads required for every transmission line segment. The segment totals were then aggregated to create the total number of access road miles needed for each alternative in each Region. Access road miles along with other metrics were used to make comparisons between the alternatives. This programmatic methodology and the results were reviewed and approved by the lead agencies for use in the EIS analysis and are carried forward for use in this BA.

ROW and Temporary Work Areas

Table 2-4 provides calculated areas of impact for temporary work areas. **Figure 2-5** depicts a typical transmission line construction ROW and temporary work areas. Vegetation within the ROW would be cleared and maintained in accordance with a Vegetation Management Program developed specifically for this Project. The proposed approach is to clear the ROW of any vegetation greater than 6 feet in height while leaving low-growing vegetation, stumps, and roots to provide cover and soil stabilization.

Temporary work areas would include work areas at each structure site; pulling, tensioning and spicing sites; staging areas; material storage yards; batch plant sites; fly yards; and guard structures. Temporary work areas would be cleared of vegetation or flagged, as needed, prior to construction.

Individual sites would be cleared to install the transmission line structures and facilitate access for future transmission line and structure maintenance. The area cleared would provide the space for construction laydown, structure assembly, and erecting towers at each structure site within the ROW. To the extent necessary, the work area would be cleared of vegetation and bladed to create a safe working area for placing equipment, vehicles, and materials. Wire pulling, tensioning and splicing sites would be cleared and bladed only to the extent necessary to perform safe wire installation construction activities. During planning for wire installation activities, wire pulling and tensioning and splicing sites would be selected to minimize clearing and blading to the extent practical such that actual disturbance areas would be minimized.

The staging areas would be located in previously disturbed sites or in areas of minimal vegetation cover where possible. The staging areas would serve as FOs; reporting locations for workers; parking space for vehicles and equipment; and sites for material storage, fabrication assembly, concrete batch plants, and stations for equipment maintenance. Staging area locations would be finalized following discussion with the land management agency or negotiations with landowners. In some areas, the staging area may need to be scraped by a bulldozer and a temporary layer of rock laid to provide an all-weather surface. Unless otherwise directed by the landowner, the rock would be removed from the staging area upon completion. Additionally, fly yards for helicopter operations would be located where helicopter construction is planned.

Transmission Structures

Structure Foundations

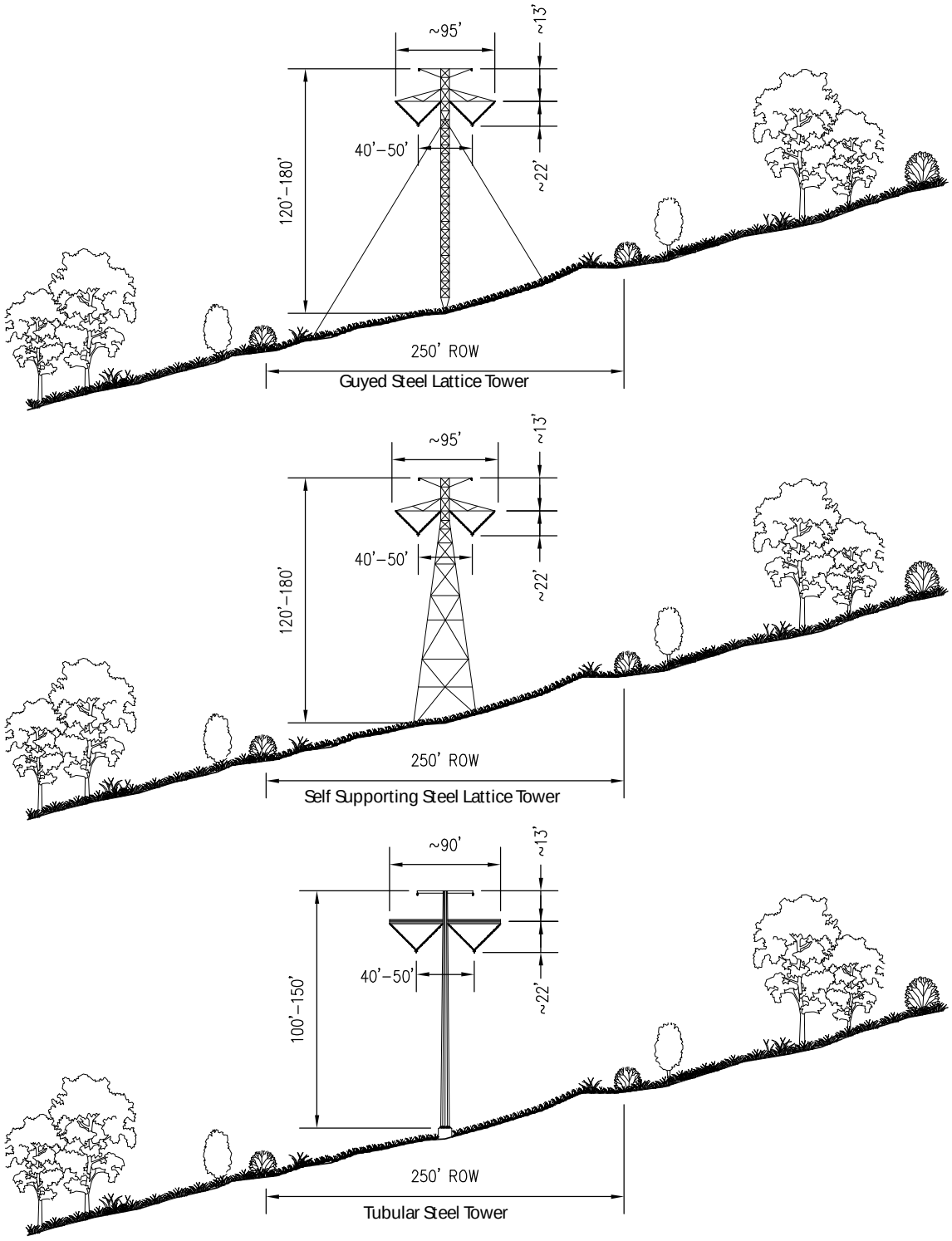
Table 2-2 identifies the three main types of transmission line tower structures being considered for the Project **Table 2-4** summarizes the total area of impact associated with these structures and Project-associated communication sites. **Figure 2-6** provides an illustration of the three structure types. Foundations for guyed steel lattice towers typically would be small precast or cast-in-place concrete pedestals. The precast pedestals would be transported to the tower site on a flatbed truck and set in a small excavation dug by a backhoe or digger.

Guyed lattice structures require the installation of anchors and guy wires to support the structure. Depending upon the soil type and engineering strength requirements, anchors would be drilled and secured either with epoxy or grouted anchors or with excavated plate anchors. Drilled anchors would require truck- or track-mounted drilling equipment to drill a hole 4 to 8 inches in diameter, 20 to 40 feet or more in depth. The anchor rod would be inserted into the open bore and secured to the soil or rock with epoxy or grout. Plate anchors are installed in a 3- to 4-foot-diameter excavation, 10 to 20 feet in depth, drilled by a truck- or track-mounted drilling rig. The anchor rod is attached to the plate anchor and the excavation is backfilled and compacted.

The single-shaft tubular steel poles and self-supporting steel lattice towers typically would be supported by cast-in-place drilled concrete pier foundations. For these structure types, vertical excavations for foundations would be made. Where soils permit, truck- or track-mounted augers of various sizes, depending on the diameter and depth requirements of the hole to be drilled, would be used. In rocky areas, the foundation holes may be excavated by drilling or blasting methods, or by installing special rock anchor or micro-pile type foundations. The rock anchoring or micro-pile system would be used in areas where site access is limited, or where adjacent structures could be damaged as a result of blasting or rock hauling activities.

After excavation and prior to structure installation, reinforced-steel anchor bolt cages would be installed. These cages would be assembled at the nearest laydown yard or staging area and delivered to the tower site via flatbed truck. These cages would be inserted in the holes then filled with concrete.

Typically, and because of the remote location of much of the transmission line route, concrete would be provided from portable batch plant areas as described above. Concrete would be delivered directly to the site in concrete trucks with a capacity of up to ten cubic yards. In the more developed areas along the route, the Contractor may use local concrete providers to deliver concrete to the site when economically feasible.



TRANSWEST EXPRESS TRANSMISSION PROJECT

Figure 2-6
Potential
Transmission Line
Structure Types

Source: TWE 2011

06/04/14

Tower Erection

Typical tower erection and conductor stringing is depicted in **Figure 2-7**. **Table 2-4** identifies the approximate area of impact associated with conductor stringing and tensioning sites. Bundles of steel members and associated hardware (insulators, hardware, and stringing sheaves) would be transported to each structure site by truck. Wood blocking would be hauled to each location and laid out; the tower steel bundles would be opened and laid out for assembly by sections and assembled into subsections of convenient size and weight. Typically, the leg extensions for the towers would be assembled and erected by separate crews with smaller cranes to prepare for setting of the main tower assembly. The assembled subsections would be hoisted into place using a large crane and fastened together to form a complete tower. A follow-up crew then would tighten all the bolts in the required joints.

Special Construction Practices

In sensitive areas, such as habitat for endangered plant species, helicopters can be used for tower installation, avoiding or minimizing the need to put access roads through these areas. The use of helicopters for tower erection is similar to that described above; however, the initial assembly is completed at a fly yard according to the lift capacity of the helicopter. Completed tower assemblies are attached to the helicopter by cable and flown to the tower site. There, the assembly is placed on the foundation or atop the previous tower section. Guide brackets attached on the top of each section assist in aligning the stacked sections. Once aligned correctly, line crews climb the towers to permanently bolt the sections together. Use of these construction practices can eliminate the need for access roads and temporary work areas within and adjacent to the proposed ROW.

Stringing of Conductors, Shield Wire, and Fiber Optic Ground Wire

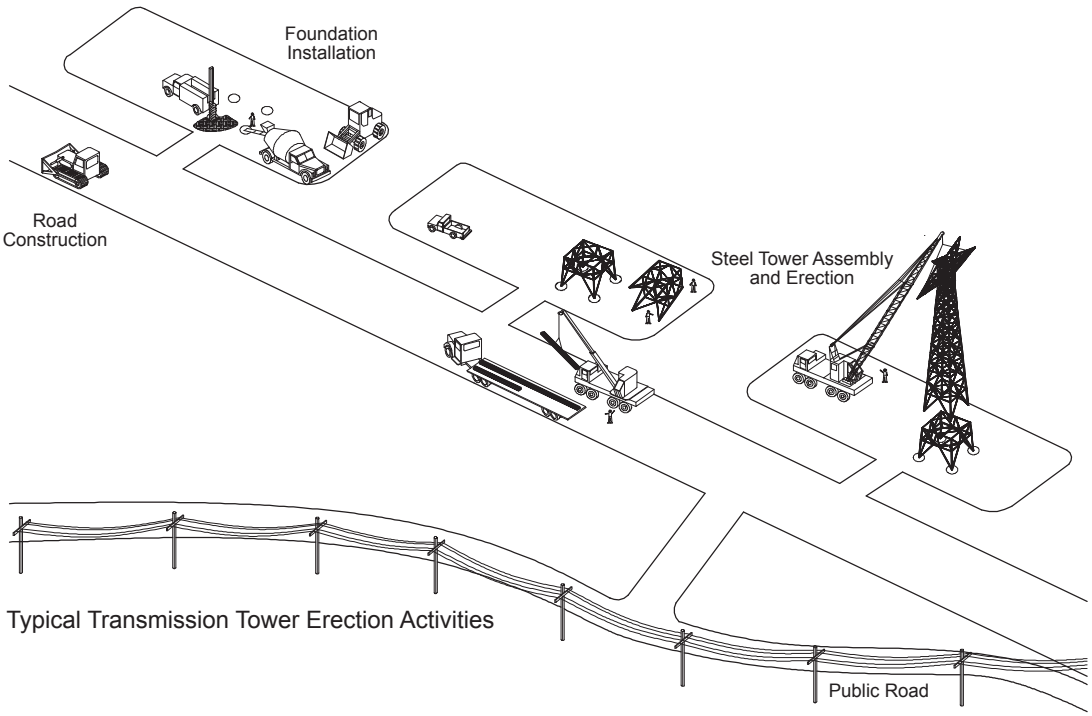
For protection of the public during stringing activities, temporary guard structures would be erected at road crossing locations where necessary. Guard structures would consist of H-frame wood poles placed on either side of the road to prevent ground wires, conductors, or equipment from falling on underlying facilities and disrupting road traffic. Equipment for erecting guard structures would include augers, backhoes, line trucks, boom trucks, pole trailers, and cranes. Guard structures may not be required for small roads. In such cases, other safety measures such as barriers, flaggers, or other traffic controls would be used. Following stringing and tensioning of all ground wires and conductors, the guard structures would be removed and the area restored.

Insulators, hardware, and stringing sheaves would be delivered to each tower site. The towers would be rigged with insulator strings and stringing sheaves at each shield (ground) wire and conductor position.

Pilot lines would be pulled (strung) from tower to tower by either a helicopter or land operated equipment, and threaded through the stringing sheaves at each tower. Following pilot lines, a stronger, larger diameter line would be attached to conductors to pull them onto towers. This process would be repeated until the shield wire, optical ground wire, or conductor is pulled through all sheaves.

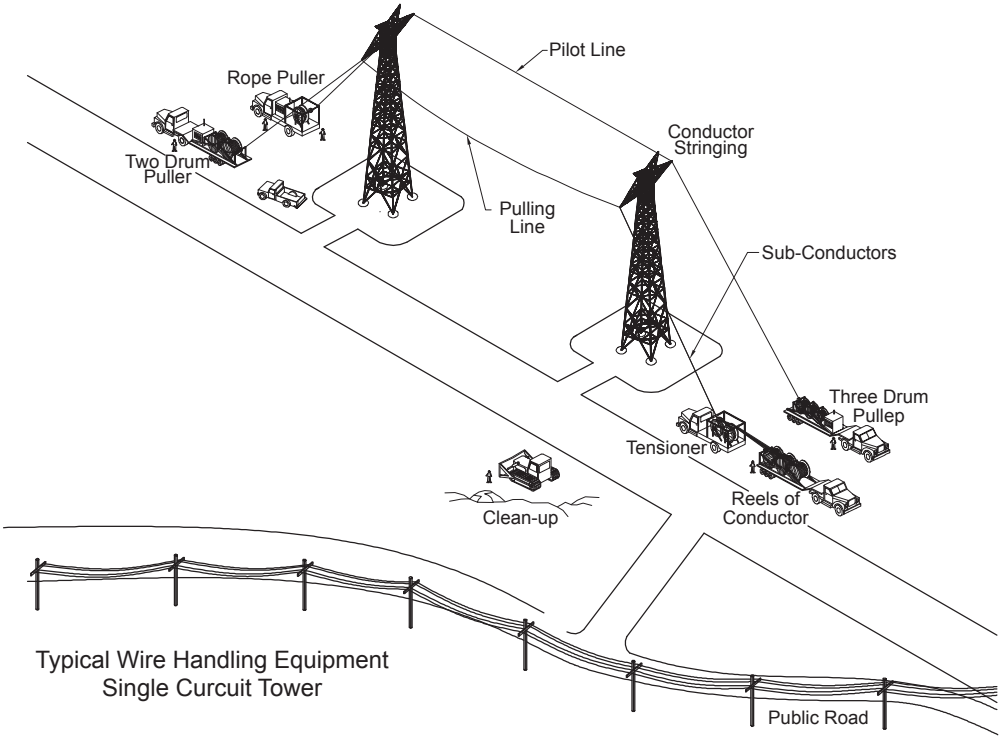
Shield wires, fiber optic cable, and conductors would be strung using powered pulling equipment at one end and powered braking or tensioning equipment at the other end of a conductor segment. The tensioner, in concert with the puller, would maintain tension on the ground wires or conductor while they are fastened to the towers. Once each type of wire has been pulled in, the tension and sag would be adjusted, stringing sheaves would be removed, and the conductors would be permanently attached to the insulators. At tangent and small-angle towers, the conductors would be attached to the insulators using clamps while at the larger angle dead-end structures the conductors are cut and attached to the insulator assemblies by “dead-ending” the conductors using industry-recognized methods.

A



Typical Transmission Tower Erection Activities

B



Typical Wire Handling Equipment
Single Curcuit Tower

TRANSWEST EXPRESS TRANSMISSION PROJECT

Figure 2-7
Typical Tower Erection and Conductor Stringing Construction

Source: TWE 2011

06/04/14

2.3.2.2 Ancillary Facilities

Communication System

The Project would require a number of critical telecommunications support subsystems. The primary communications for protection and control would be provided via the one fiber optic ground wire installed in the shield wire position on the transmission line. For redundancy purposes, a secondary communications path would be provided via existing or expanded/upgraded microwave systems or existing alternate buried fiber paths in the area.

The primary fiber optic system would require signal regeneration sites to amplify the signals if the distance between stations or regeneration sites exceeds approximately 50 miles. A total of 15 to 20 regeneration sites would be required for the proposed Project. In most cases, the regeneration communication sites would be located within the transmission line ROW and would typically be 100 feet by 100 feet or less in size. TransWest also may contract with third parties for the sale and use of excess fiber optic capacity. No additional facilities are anticipated for third-party use of excess fiber optic capacity.

The secondary communications path would be provided either by a private Project microwave system or purchasing/leasing capacity on existing utility-dedicated communication networks within the Project region. If required, a private microwave system would be structured to utilize existing developed communications sites, access roads and utility held sites to the maximum extent possible. A small number of new microwave sites may be required for the Project. A typical microwave communication site is less than 100 feet by 100 feet and consists of a fenced enclosure that contains a small building for the communications equipment and a tower for mounting the microwave antennas. The microwave tower may be 50 to 150 feet tall to meet the system's line-of-sight communications requirement.

To facilitate mobile communications along the transmission line route for transmission line patrol, inspection, routine maintenance and emergency operations, a mobile ultra-high frequency (UHF)/very high frequency (VHF) radio communications system would be implemented. For planning purposes, UHF/VHF radio equipment, towers, antennae and repeaters are assumed to be installed at each regeneration station.

Ground Electrode Systems

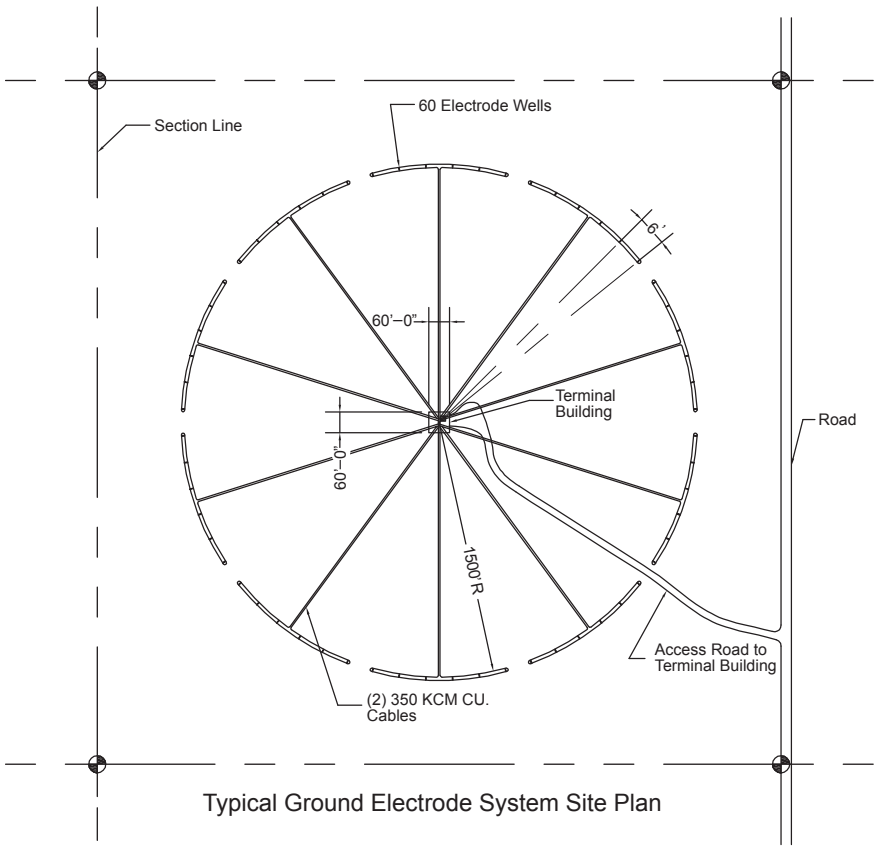
One ground electrode facility consisting of a small aboveground building and surrounding underground electrode bed wells (**Figure 2-8**) would be required within approximately 100 miles of each of the Northern and Southern terminals. This would establish and maintain electrical current continuity during normal operations and during any unexpected outage of the 600-kV DC terminal or converter station equipment. **Table 2-5** summarizes the area of disturbance associated with the two proposed ground electrode systems, Bolten Ranch in Carbon County, Wyoming, and Halfway Wash East in Clark County, Nevada.

Each ground electrode facility would consist of a network of approximately 60 deep-earth electrode wells arranged along the perimeter of a circle expected to be about 3,000 feet in diameter. Each electrode well would be a 12- to 18-inch-diameter bore drilled to a depth of 200 to 700 feet (depth based upon engineering and design). All wells at a site would be electrically interconnected and wired via approximately 10 low voltage underground cable "spokes" to a small control building. A low voltage electrode line would connect the ground electrode facilities to the AC/DC converter stations. To the extent practical, the overhead electrode line would be located on the 600-kV DC structures in the overhead shield wire position. Where the electrode line diverges from the 600-kV DC transmission line, it would be located on single-pole structures, similar to those used for a modified 34.5-kV/69-kV distribution transmission line, built within a separate 50-foot-wide ROW.

A

Typical Above Ground Installation at the Ground Electrode Facility

B



Typical Ground Electrode System Site Plan

TRANSWEST EXPRESS TRANSMISSION PROJECT

Figure 2-8
Typical Ground Electrode System Above Ground Installation and Site Plan

Source: TWE 2011

Western Area Power Administration

During a DC transmission disturbance where one circuit becomes inoperable, the ground electrodes would carry a short-term large current that was previously flowing in the inoperable circuit. Contingency conditions that result in high ground electrode currents are most often the result of an unexpected outage on the transmission line or equipment in the AC/DC converter station. The high current operation of the ground electrode facilities and the use of the earth as a return path is limited to unexpected emergency conditions and typically only operated for 10 minutes to less than 1 hour following the loss of a circuit. Although the ground electrode facilities would be designed to operate at high current levels for up to 200 hours per year, typical yearly use at high currents is expected to be less than 30 hours per year. The use of these ground electrode facilities allows system operators to maintain a portion of the power transmission capacity to support power network reliability. This feature would allow critical time for network operators to determine the extent of the electrical disturbance and reconfigure the transmission and generation systems into a more stable configuration that minimizes disruption of customer loads.

The specific location of the ground electrode systems would be identified during final engineering and design; however, general siting areas associated with the Proposed Action, including the Bolten Ranch Facility and Halfway Wash East, have been identified in Regions I and III, respectively, and are analyzed in this BA. Additionally, the lower voltage connector lines from the 600-kV DC transmission line to each of the two ground electrode sites have been analyzed.

Terminals

Northern and southern terminals would be required for the transmission line. The Northern Terminal would be located approximately 3 miles southwest of Sinclair, Wyoming; the Southern Terminal would be located approximately 1 mile northeast of the Marketplace Hub in the Eldorado Valley within the city limits of Boulder City, Nevada.

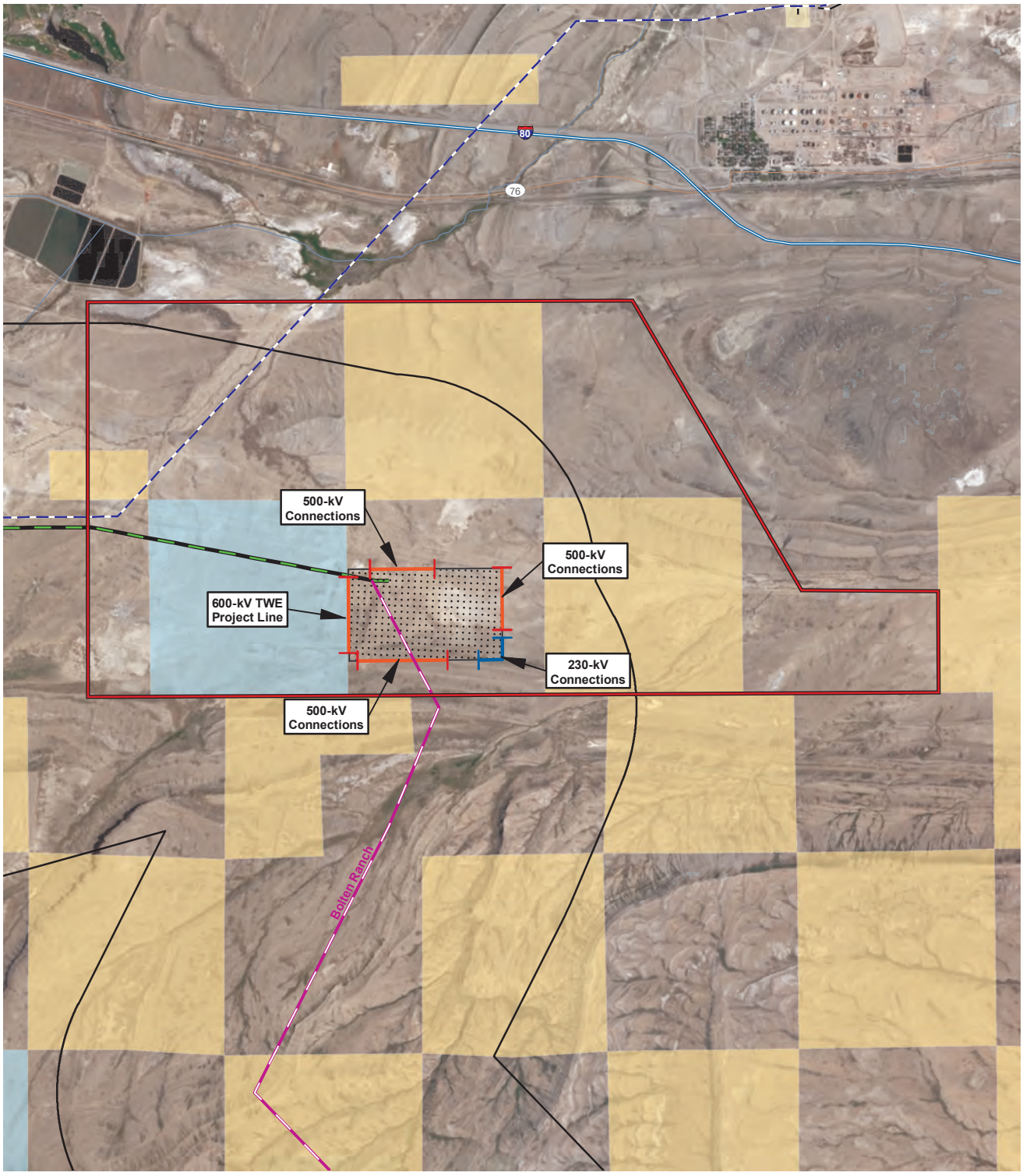
The terminal stations would include an AC/DC converter station and adjacent AC substation. The AC/DC converter station would include a 600-kV DC switchyard; AC/DC conversion equipment; transformers; and multiple equipment, control, maintenance, and administrative buildings.

Two buildings would house the AC/DC conversion equipment, each approximately 200 feet long by 80 feet wide and 60 to 80 feet high. Smaller buildings would house the control room, control and protection equipment, auxiliary equipment, and cooling equipment. The AC substation at the Northern Terminal would be a 500-/230-kV substation, and the AC substation at the Southern Terminal would be a 500-kV substation. The AC substations would include a switchyard, transformers, control equipment, and control buildings. Connections to the existing transmission infrastructure also would be constructed. **Table 2-6** summarizes the general terminal facility lengths and areas of disturbance.

Northern Terminal

The Northern Terminal facilities would be located on private lands in Carbon County, Wyoming, approximately 3 miles southwest of the Town of Sinclair, Wyoming (**Figure 2-9**). The Northern Terminal would connect to the existing Platte – Point of Rocks 230-kV line located within 1 mile of the terminal. If needed to provide connection to the Aeolus and Anticline substations, the Northern Terminal also could connect to the Energy Gateway West and Energy Gateway South 500-kV transmission lines currently proposed by PacifiCorp. TransWest requested an interconnection with both projects from PacifiCorp in 2009. Based on the approved alternative for the Energy Gateway West transmission project and pending the outcome of the National Environmental Policy Act (NEPA) process for the Energy Gateway South transmission line, it is reasonably foreseeable that the interconnections between these two projects and the Proposed Action would be at the Northern Terminal. The Northern Terminal would require the following components:

K:\Projects_4\TransWestExpress\12907_003_Transwest_Express\Figures\DocumentFigures\2015_BA_v2\GeneralFigures\Fig_02_09_NorthernTerminal.mxd



Proposed Action
Action Area
Terminal Siting Area
Ground Electrode Overhead Electrical Line
Proposed Terminal Site with Connection Types

Existing Transmission
230- to 287-kV
115-kV

Jurisdiction
Bureau of Land Management
Bureau of Reclamation
State
Private

TRANSWEST EXPRESS TRANSMISSION PROJECT

Figure 2-9
Northern Terminal Site

0 1,000 2,000 4,000 Feet
0 200 400 800 Meters
1:48,000

N

Western AREA POWER ADMINISTRATION

- An AC/DC converter station (a 600-kV DC switchyard and a converter building containing electronics and control equipment) approximately 30 acres in size.
- A 500-/230-kV AC substation approximately 135 acres in size.
- A 230-kV AC substation approximately 25 acres in size.
- An electrical connection from the AC/DC converter station to the 600-kV DC transmission line connecting to the Southern Terminal. All facilities for this connection are incorporated into the 600-kV DC transmission line.
- Two electrical connections from each (four connections total) of the proposed single circuit Energy Gateway West and Energy Gateway South 500-kV transmission lines (if approved) to the 500-/230-kV substation. These connections would connect the Northern Terminal to both the Aeolus and Anticline substations via the Energy Gateway West and Energy Gateway South 500-kV transmission lines (if approved). These two connections may require 500-kV transmission facilities, approximately 4 miles total or less in length, to connect the 500-/230-kV substation to the route of the Energy Gateway South 500-kV transmission line (if approved).
- Two electrical interconnections to the existing Platte – Point of Rocks 230-kV line, which would be rerouted into and out of the 230-kV substation. This 230-kV connection is assumed to require approximately 4 miles or less of double-circuit 230-kV transmission line.
- Up to six electrical interconnections from proposed and planned generation facilities by 230-kV transmission lines.

The three major components of the Northern Terminal (AC/DC converter station, 500-/230-kV AC substation, and 230-kV AC substation) would be co-located and contiguous. Although these three components would be stand-alone facilities and could be located on separate parcels connected together by short transmission lines, it is common practice and preferable for the AC/DC converter station and 500-/230-kV AC substation(s) to be adjacent to each other. It also is preferable to locate the 230-kV AC substation next to the 500-kV AC substation. However, depending on the availability of space and other constraints in this area, these stand-alone facilities could be separated by a distance of up to 2 miles.

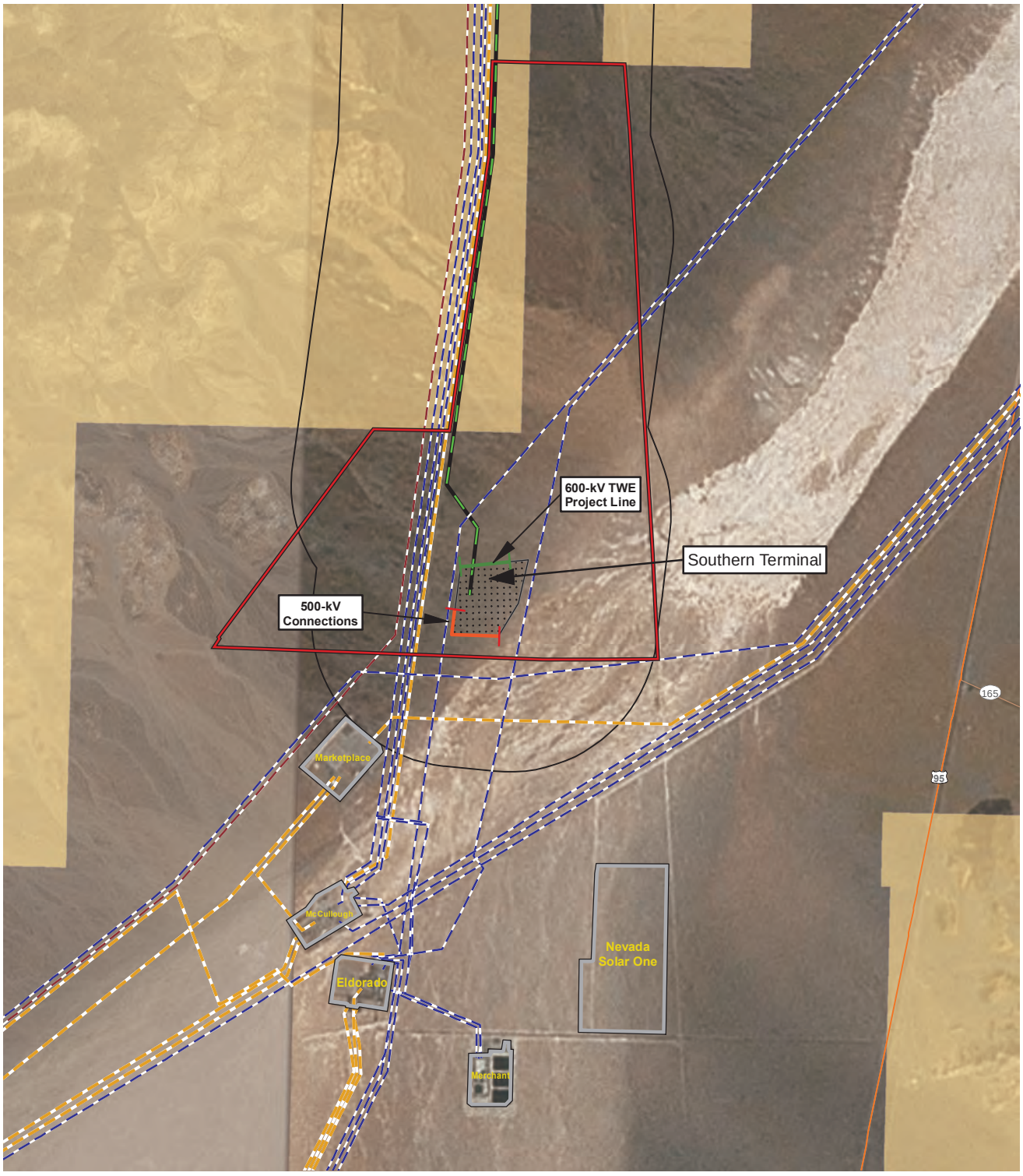
Southern Terminal

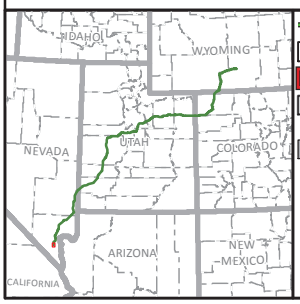
The Southern Terminal facilities would be located in the Eldorado Valley on private or public land, within the city limits of Boulder City, in Clark County, Nevada (**Figure 2-10**). Two alternative sites are being analyzed for the Southern Terminal in the Eldorado Valley; either would contain the same facilities. The Southern Terminal would connect to all four of the existing 500-kV substations (Eldorado, Marketplace, Mead, and McCullough) located at the Marketplace Hub.

The Southern Terminal would require the following components:

- An AC/DC converter station (a 600-kV DC switchyard and a converter building containing power electronics and control equipment) approximately 30 acres in size.
- A 500-kV AC substation approximately 110 acres in size.
- An electrical connection from the AC/DC converter station to the 600-kV DC transmission line. All facilities for this connection would be incorporated into the 600-kV DC transmission line.
- Two electrical connections from the existing Mead – Marketplace 500-kV transmission line to the new 500-kV AC Substation. These connections would connect the Southern Terminal to both the Mead and Marketplace substations via the existing Mead – Marketplace 500-kV transmission line. These two connections may require 500-kV transmission facilities, assumed to total 4 miles or less in length, to connect the new 500-kV AC substation to the existing Mead – Marketplace 500-kV transmission line.

K:\Projects_4\TransWestExpress\12907_003_Transwest_Express\Figures\DocumentFigures\2015_BA_v2\GeneralFigures\Fig_02_10_SouthernTerminal.mxd





Proposed Action
Action Area
Terminal Siting Area
Proposed Terminal Site with Connection Types
Other Facilities

Existing Transmission
500-kV +/- DC
500-kV
230- to 287-kV

Jurisdiction
Bureau of Land Management
Private

TRANSWEST EXPRESS TRANSMISSION PROJECT

Figure 2-10
Southern Terminal Site

0 1,000 2,000 4,000 Feet
0 200 400 800 Meters
1:64,000

N

Western AREA POWER ADMINISTRATION

Exported On: 2/20/2015

- Construction of 500-kV transmission line from the new 500-kV AC substation to each of the Eldorado and McCullough substations. These single circuit 500-kV transmission lines are each estimated to be 5 miles or less in length.
- Although not anticipated at this time, one or more of the existing 138-/230-kV lines within the Proposed Terminal Siting Area may need to be re-routed/re-configured to accommodate the Southern Terminal due to congestion within the area. If necessary, this reroute or reconfiguration of 138-/230-kV transmission line facilities is not anticipated to impact more than 5 miles of existing lines.

The two major components of the Southern Terminal (AC/DC converter station and the 500-kV AC substation) would be co-located and contiguous. Although these two components would be stand-alone facilities and could be located on separate parcels connected together by short transmission lines, it is common practice and preferable for the AC/DC converter station and 500-kV AC substation to be adjacent to each other.

2.3.3 Operations and Maintenance

During the operation and maintenance of the transmission line, tower location sites and communication sites would remain in place within the ROW. Access roads would remain to the extent they are required for structure and facility access. All construction sites and temporary work areas would be reclaimed upon completion of construction.

Regular inspection of transmission lines, terminals, substations, ground electrodes, and support systems is critical for safe, efficient, and economical operation of the Project. Regular ground and aerial inspections would be performed in accordance with the Applicant's established policies and procedures for transmission line inspection and maintenance (Western 2007). The Project ±600-kV DC, 500-kV AC, and 230-kV AC transmission lines, terminals, substations, ground electrode systems, communications system, and other ancillary facilities would be inspected regularly for corrosion, equipment misalignment, loose fittings, vandalism, and other mechanical problems. The need for vegetation management on transmission line ROWs also would be determined during inspection patrols.

2.3.3.1 Transmission Line

Inspection of the entire transmission line system would be conducted semi-annually. Aerial inspection would be conducted by helicopter semi-annually and would require two or three crew members, including the pilot. Detailed ground inspections would take place on an annual basis using access roads to each structure, where available. Ground inspection would use 4x4 trucks or 4x4 all-terrain vehicles (ATVs) for all structures with access roads. For structures in areas without permanent access roads, ground inspection would be on foot or by other approved means. The inspector would assess the condition of the transmission line and hardware to determine if any components need to be repaired or replaced, or if other conditions exist that require maintenance or modification activities. The inspector also would note any unauthorized encroachments and trash dumping on the ROW that could constitute a safety hazard. The inspector would access each of the structure locations along each line and use binoculars and spotting scopes to perform this inspection.

Routine maintenance activities are ordinary maintenance tasks that have historically been performed and are regularly carried out on a routine basis. The work performed is typically repair or replacement of individual components (no new ground disturbance), which is performed by relatively small crews using a minimum of equipment and usually is conducted within a period from a few hours up to a few days. Work requires access to the damaged portion of the line to allow for a safe and efficient repair of the facility. Equipment required for this work may include four-wheel-drive trucks, material (flatbed) trucks, bucket trucks (low reach), boom trucks (high reach), or man lifts. This work is scheduled and is typically required due to issues found during inspections. Typical items that may require periodic replacement on structures include insulators, hardware, or structural members. It is expected that these replacements would be required infrequently.

If during transmission line maintenance and monitoring, it is determined that new construction or reconstruction activities should be implemented, the Applicant would notify the appropriate land management agency or private landowner, and obtain proper approvals, as necessary.

Dust control during maintenance of the transmission line would be managed the same as during construction.

Transmission Line ROW

The Applicant would maintain work areas adjacent to structures and along the ROW for vehicle and equipment access necessary for operations, maintenance, and repair. Where long-term access is required for maintenance of the line, the Applicant would maintain the approved access roads in a safe, useable condition, as directed by an authorized officer from the appropriate land management agency or by the private landowner.

When needed, ROW repairs would be conducted in accordance with the stipulations outlined in the ROW grant. Maintenance may include grading or repair of existing maintenance access roads and work areas, and spot repair of sites subject to erosion, flooding or scouring. Access road maintenance entails activities to ensure that approved access roads are in appropriate condition for access to transmission lines by maintenance and inspection crews. These activities include re-grading, resurfacing, and re-constructing water diversions such as culverts, ditches and water bars. Required equipment may include a grader, backhoe, four-wheel-drive pickup truck, and a cat-loader or bulldozer. The cat-loader has steel tracks whereas the grader, backhoe, and truck typically have rubber tires. Repairs to the ROW would be scheduled as a result of line inspections, or would occur in response to an emergency situation. Refer to POD Appendix O, Section O6.0 for a description of access road management activities.

Snow removal, if necessary for terminal, substation, ground electrode and regeneration station access roads, would be performed with blades equipped with shoes to keep the blade off the road surface in order to avoid damage.

Vegetation within the ROWs would be managed in accordance with the TWE Project Vegetation Management Program described in detail below.

Vegetation Management Program

A Vegetation Management Program has been developed and would be implemented for the Project. The Program has been designed to meet North American Electric Reliability Corporation (NERC) reliability requirements in a cost-effective manner, and provide measures for minimizing potential conflicts with critical environmental resources or management issues. The vegetation management program for the Project transmission line ROWs is based on meeting reliability requirements of NERC through integrative vegetation management (IVM) practices (American National Standards Institute, Inc. [ANSI] 2006; NERC 2009). The Project program would comply with NERC reliability standards.

NERC has established reliability standard FAC-003-2 to prevent vegetation related outages from occurring on bulk transmission systems, which could lead to cascading outages. The standard was developed in response to serious outages and operational problems, which have resulted from interference between overgrown vegetation and transmission lines over the past 10 to 20 years. Compliance with this standard is mandatory. FAC-003-2 requires having and implementing a documented transmission vegetation management program, designed to control vegetation on transmission ROWs (NERC 2009).

IVM is a best management practice (BMP) conveyed in the American National Standard for Tree Care Operations, Part 7 (ANSI 2006) and the International Society of Arboriculture's Best Management Practices: Integrated Vegetation Management (Miller 2007). IVM is consistent with the requirements of FAC-003-2 and is recognized as containing the most appropriate techniques for transmission ROWs to

meet and exceed the NERC requirements (NERC 2009). IVM is a system of managing plant communities by setting objectives for desired conditions and identifying and managing ROWs for compatible and incompatible vegetation. Implementation of Project's Vegetation Management Plan would comply with NERC standards through IVM practices. IVM principles would serve as guidance in establishing and maintaining a desired condition for Project ROWs and associated facilities.

Maintenance activities include equipment testing, equipment monitoring and repair, and emergency and routine procedures for service continuity and preventive maintenance. Terminal, substation, ground electrode and regeneration station monitoring and control functions are performed wholly or in part remotely from the Applicant's central operations facilities. Unauthorized entry into the terminal, substations or regeneration stations is prevented with the provision of fencing and locked gates. Warning signs would be posted and entry to the operating facilities would be restricted to authorized personnel.

Surface disturbance associated with operation and maintenance activities is listed in **Table 2-4**.

2.3.4 Decommissioning

At the end of the Project's operational life (50 years or longer), if the facilities were no longer required, the transmission line would be decommissioned. At such time, conductors, insulators, and hardware would be dismantled and removed from the ROW. Structures would be removed and foundations removed to below ground surface. Following abandonment and removal of the transmission line structures and equipment from the ROW, any areas disturbed during line dismantling would be restored and rehabilitated. TransWest would be responsible for the decommissioning and reclamation of access roads following abandonment in accordance with the landowner's or land agency's direction.

2.4 Summary

Table 2-7 summarizes the individual components of the proposed action and identifies relevant design features and conservation measures applicable to each component and phase of the Proposed Action. This table is meant to assist the USFWS in "deconstructing the action" and evaluating the effects and associated impact avoidance and minimization measures in terms of individual project components. Refer to Chapter 3.0 for definitions of Applicant-committed design features and mitigation measures and additional conservation measures. Refer to Chapter 5.0 for a general assessment of project effects on listed, proposed, and candidate species by Project component and phase. Chapter 6 contains detailed, species-specific assessments and associated conservation measures.

Table 2-7 TransWest Transmission Line Project Phases, Activities, and Associated Conservation Measures

Project Phase	Activity	Applicable Design Features and Additional Conservation Measures[1]
Pre-construction	Environmental Surveys	TWE-1, TWE-2, TWE-26, TWE-31, TWE-34, TWE-64, SSWS-15, NX-1, SS-1
	Engineering Surveys	Same as for Environmental Surveys plus: TWE-4, TWE-29, TWE-32, WLF-1, WLF-2
	Geotechnical Investigations	Same as for Environmental and Engineering Surveys plus: TWE-5, TWE-22, TWE-47, TWE-61, TWE-62, SS-4, SS-5, SSS-1
Construction Activities	Transmission Line	
	• Access Roads	TWE-1, TWE-2, TWE-3, TWE-4, TWE-5, TWE-6, TWE-7, TWE-8, TWE-9, TWE-11, TWE-12, TWE-13, TWE-14, TWE-19, TWE-20, TWE-21, TWE-22, TWE-23, TWE-24, TWE-26, TWE-29, TWE-31, TWE-32, TWE-33, TWE-34, TWE-47, TWE-53, TWE-57, TWE-59, TWE-60, TWE-61, TWE-62, TWE-64, SSWS-15, SSWS-16, WLF-1, WLF-2, SSS-1, SSS-2, SSS-3, SSS-4, SSS-11, WR-3, NX-1, NX-2, VG-1, WET-1, WET-2, WET-3, SS-3, SS-4, SS-5, SS-6, SS-9, AB-1, AB-2, AB-3, AB-4
	• ROW and Temporary Work Areas	Same as for Access Roads plus: TWE-10, TWE-15, TWE-16, TWE-27, TWE-28, TWE-58, WLF-6, NX-3, NX-4, VG-3, VG-4, VG-5
Construction Activities (cont.)	• Tower Structures	
	– Foundations	TWE-23, TWE-25, TWE-53, SSS-2, SSS-4
	– Tower Erection	Special Construction Practices, including use of helicopters for tower installation, can eliminate need for access roads and temporary work areas in sensitive species' habitats
	– Stringing of Conductors	TWE-30, TWE-45, WLF-5, WLF-7, WLF-8
	Ancillary Facilities	
	• Communication System	TWE-8, TWE-9, TWE-12, TWE-13, TWE-19, TWE-22, TWE-23, TWE-26, TWE-28, TWE-29, TWE-31, TWE-32, TWE-33, TWE-57, TWE-58, TWE-59, TWE-60, TWE-61, TWE-62, TWE-64, SSWS-16, WLF-1, WLF-2, WLF-4, NX-1, NX-2, VG-1, VG-3, SS-3, SS-4, SS-9
	• Ground Electrode System	Same as Communication System
	• Terminals	Same as Communication System

Table 2-7 TransWest Transmission Line Project Phases, Activities, and Associated Conservation Measures

Project Phase	Activity	Applicable Design Features and Additional Conservation Measures[1]
Operations & Maintenance	Transmission Line and Ancillary Facilities	
	• Semi-annual aerial inspections	None
	• Annual ground inspections	TWE-1, TWE-2, TWE-3, TWE-24, TWE-31, TWE-32, TWE-45, TWE-64, SSWS-15, SSS-11, VG-3, SS-5, AB-2
	• Maintain access roads and work areas	TWE-9, TWE-12, TWE-24, TWE-31, TWE-32, TWE-47, TWE-61, TWE-62, TWE-64, SSWS-15, SSWS-16, WLF-1, WLF-2, WLF-10, SSS-1, NX-1, AB-2
	• Vegetation management	TWE-24, TWE-26, TWE-28, TWE-29, TWE-31, TWE-32, TWE-47, TWE-58, TWE-61, TWE-62, TWE-64, SSWS-15, SSWS-16, WLF-1, WLF-2, WLF-5, WLF-6, WLF-7, NX-1, NX-2, NX-3, NX-4, VG-3, SS-5, SS-6, SS-9, AB-2, AB-4
Decommissioning	Transmission Line and Ancillary Facilities	
	• Removal of aboveground structures, hardware, foundations	TWE-9, TWE-22, TWE-24, TWE-26, TWE-29, TWE-31, TWE-32, TWE-47, TWE-53, TWE-57, TWE-61, TWE-62, TWE-64, SSWS-16, WLF-1, WLF-2, SS-5, SS-6
	• Reclamation of ROW, access roads, and ancillary facility sites	TWE-6, TWE-12, TWE-13, TWE-16, TWE-24,TWE-26, TWE-29, TWE-31, TWE-32, TWE-47, TWE-57, TWE-61, TWE-64, SSWS-16, WLF-1, WLF-2, WLF-10, NX-1, NX-2, VG-1, VG-3, SS-5, SS-6

[1] Non-species-specific conservation measures are defined and described in Chapter 3.0; species-specific conservations measures are described in Chapter 6 in the individual species sections to which they apply.

1

3.0 Impact Avoidance and Minimization

This section summarizes and incorporates by reference existing impact avoidance and minimization measures that pertain, either directly or indirectly, to federally listed species. Existing measures that are part of BLM resource management plans (RMPs) or USFS land and resource management plans (forest plans) are incorporated by reference to Appendix C of the TWE Final EIS. These measures are identified by BLM Field Office and National Forest and incorporated by reference to the EIS in Section 3.1, below. For the purposes of this BA, Applicant-committed mitigation measures and design features are considered conservation measures and are summarized in Section 3.2, **Table 3-1**. Additional mitigation measures that have been developed to avoid or minimize adverse effects to wildlife, aquatic biota, plants, and other resources such as water bodies and wetlands, have been developed through the course of the TWE NEPA process and are presented in Table C.5-1 of the Final EIS. Those measures with direct or indirect applicability to conserving listed, EXP/NE, and candidate species are presented in **Table 3-2**. Conservation measures pertaining to individual species are presented in Chapter 6.0 of the BA under the species to which they apply.

3.1 Existing Impact Avoidance and Minimization Measures

Existing measures including the West-wide Energy Corridor (WWEC) Final Programmatic EIS BMPs, BLM RMP surface use and timing restrictions, and USFS Land Resource Management Plan (LRMP) standards and guidelines would require the Project to avoid and minimize impacts to federally listed species and their habitats. Additional protection would be provided by Applicant-committed design features and mitigation measures, which are listed in Appendix C.2 of the Final EIS as well as in TWE POD, which is located in Appendix D of the Final EIS.

Complete lists of these measures are contained in Appendix C of the Final EIS. WWEC BMPs (Final EIS Table C.1-1) must be adhered to wherever the Proposed Action is located within a WWEC-designated utility corridor, which includes considerable portions of the Project in Wyoming, eastern Colorado, west-central Utah, and southern Nevada. BLM surface use and timing restrictions pertaining to the BLM Rawlins (Tables C.3-4 and C.3-5), Little Snake (Tables C.3-8 and C.3-9), White River (Tables C.3-12 and C.3-13), Vernal (Tables C.3-14 and C.3-15), Salt Lake (Tables C.3-22 and C.3-23), Fillmore (Table C.3-24 and C.3-25), Cedar City (Tables C.3-26 and C.3-27), Caliente (Tables C.3-30 and C.3-31), and Las Vegas (Tables C.3-32 and C.3-33) FOs and USFS standards and guidelines associated with the USFS Uinta-Wasatch-Cache (Uinta Planning Area) (Final EIS Section C.4.4) and Fishlake (Final EIS Section C.4.3) National Forests apply to the Proposed Action analyzed in this BA. Many of these measures are specific to individual listed and special status species and their habitats and vary across BLM and USFS jurisdictions. Additional Project- and species-specific conservation measures have been developed during preparation of the TWE Final EIS and are listed in Appendix C, Table C.5-1 of the Final EIS. Other potential conservation measures have been provided by the USFWS and BLM during preparation of the BA. BLM, USFS, USFWS, and Project-specific mitigation and conservation measures have been considered in the analysis of Project effects on individual species and are presented in the relevant sections of Chapter 6, below.

Note that BLM and USFS management practicies pertaining to greater sage-grouse are currently being revised through the on-going greater sage-grouse land use plan amendment process. These amendments are expected to be finalized more or less concurrently with issuance of the TWE ROD. It is anticipated that the Project will not be entirely consistent with the linear utility siting restrictions contained in the applicable land use plans because the formulation of Project alternatives occurred well in advance of the plan amendment process. However, it is expected that the Project and associated greater sage-grouse impact avoidance, minimization, and compensatory mitigation measures will be generally consistent with the surface use and timing restrictions and other mitigation requirements outlined in the final RODs for the applicable land use plan amendments.

Applicant-committed mitigation measures and design features that would result in the general avoidance or minimization of Project impacts to species being carried forward for analysis in this BA are listed in **Table 3-1** below. WWEC BMPs, BLM surface use restrictions and timing limitations, and USFS standards and guidelines pertaining to other resources, such as soil conservation and noxious weed management, would have indirect benefits to federally listed, proposed, and candidate species affected by the Project. Per Applicant-committed measure TWE-1, all permitting agency requirements will be adhered to during Project planning, construction, operation, and decommissioning.

3.2 General Conservation Measures

Table 3-2 lists additional conservation measures that have been identified through development of the TWE Final EIS. Implementation of these general (i.e., non-species-specific) measures would avoid or minimize adverse effects to multiple species. The assessments of effects for individual species contained in Chapter 6.0 of this BA identify which of the following measures apply to a given species. These measures, along with the species-specific conservation measures described in Chapter 6.0, have been accounted for in evaluating residual impacts to individual species as well as in the determination of Project effects on these species.

Table 3-1 Applicant-committed Impact Avoidance and Minimization Measures Directly and Indirectly Applicable to Conservation of Federally Listed, Proposed, and Candidate Species in the TWE Action Area

Draft EIS No.	Phase(s)[1]	Topic	Description
GENERAL DESIGN FEATURES			
TWE-1	P	General, compliance with agency stipulations and RODs	The TWE Project will be planned, constructed, operated, and decommissioned in accordance with the agencies' RODs, the BLM's ROW grant stipulations, USFS Special Use Permit stipulations, and requirements of other permitting agencies.
TWE-2	P	General, compliance with laws and regulations	The Applicant will comply with all applicable environmental laws and regulations. Applicable laws and regulations may include, but are not limited to, the CWA Section 303(d) and Section 404; the Wild and Scenic Rivers Act, Section 3(a) or 2(a) ii; the ESA, Section 7; the National Historic Preservation Act (NHPA), Section 106; and the Native American Grave Protection and Repatriation Act of 1990 (NAGPRA). Compliance with all applicable laws and regulations will be documented in the Final POD/Construction, Operation, and Maintenance (COM) Plan.
TWE-3	P	General, mitigation monitoring plan	The POD will include a mitigation monitoring plan that will address how each mitigation measure required by permitting agencies in their respective decision documents and permits will be monitored for compliance.
TWE-4	P	General, environmental training	Prior to construction, all personnel will be instructed on the protection of cultural, paleontological, ecological resources, and other natural resources in accordance with the POD provisions. To assist in this effort, the construction contract would address (a) federal, state, and tribal laws regarding cultural resources, fossils, plants, and wildlife, including collection and removal; and (b) the importance of these resources and the purpose and necessity of protecting them.
PROJECT DESIGN, ACCESS, AND CONSTRUCTION			
TWE-5	P	General, compliance with laws and regulations	The POD will display the location of Project infrastructure (i.e., towers, access roads, substations) and identify short-term and long-term land and resource impacts and the mitigation measures that will be implemented for site-specific and resource-specific environmental impacts.
TWE-6	P	General, Access Road Plan	The POD will include an Access Road Plan that incorporates relevant agency standards regarding road design, construction, maintenance, and decommissioning. The Access Road Plan will incorporate BMPs, stipulated by the agencies in their respective decision documents and permits.
TWE-7	P	Access, visual	The alignment of any new access roads will follow the designated area's landform contours where practical, providing that such alignment does not additionally impact resource values. This will minimize ground disturbance and reduce scarring (visual contrast).
TWE-8	P, C	Access, tower placements, surface water, vegetation management, drainage, dust control	Crossings of streams and waterways will be done in compliance with federal, state, and local regulations. Roads will be built as near as possible at right angles to the streams and washes (Arizona crossing). Culverts will be installed where necessary. All construction and maintenance activities will be conducted in a manner that will minimize disturbance to vegetation, drainage channels, and intermittent or perennial stream banks. In addition, road construction will include dust-control measures during construction in sensitive areas. All existing roads will be left in a condition equal to, or better than, their condition prior to the construction of the transmission line. Structures will be sited with a minimum distance of 200 feet from streams, wherever possible.
TWE-9	C, O	Access	All construction vehicle movement outside the ROW normally will be restricted to pre-designated access or public roads.
TWE-10	P, C	General ROW, visual	The area limits of construction activities will normally be predetermined, with activity restricted to and confined within those limits. No paint or permanent discoloring agents will be applied to rocks or vegetation to indicate survey or construction activity limits.
TWE-11	P, C	Access, visual	In construction areas where re-contouring is not required, vegetation will be left in place, wherever possible, and original contour will be

Table 3-1 Applicant-committed Impact Avoidance and Minimization Measures Directly and Indirectly Applicable to Conservation of Federally Listed, Proposed, and Candidate Species in the TWE Action Area

Draft EIS No.	Phase(s)[1]	Topic	Description
			maintained to avoid excessive root damage and to allow for re-sprouting.
TWE-12	P, C, O	Access, soils, vegetation, water, cultural visual resources	Except for repairs necessary to make roads passable, no widening or upgrading of existing access roads will be undertaken in the area of construction and operation, where soils or vegetation are sensitive to disturbance. In designated areas, structures will be placed to avoid sensitive features such as, but not limited to, riparian areas, water courses and cultural sites, or to allow conductors to clearly span the features within limits of standard structure design. This will minimize the amount of disturbance to the sensitive feature or reduce visual contrast.
TWE-13	C	Vegetation management, restoration, erosion control	In construction areas (e.g., marshalling yards, structure sites, spur roads from existing access roads) where ground disturbance is significant or where re-contouring is required, surface restoration will occur as required by the landowner or land management agency. The method of restoration will normally consist of returning disturbed areas back to their natural contour, reseeding (if required), installing cross drains for erosion control, placing water bars in the road, and filling ditches.
TWE-14	P, C	General, soils, erosion control, visual	The POD will show the location of borrow sites, from which material will be obtained. Borrow pits will be stripped of topsoil to a depth of approximately 6 inches. Stripped topsoil will be stockpiled and, upon completion of borrow excavation, spread to a uniform depth of 6 inches over areas of borrow pits from which removed. Before replacing topsoil, excavated surfaces will be reasonably smooth and uniformly sloped. The sides of borrow pits will be brought to stable slopes with slope intersection shaped to carry the natural contour of adjacent undisturbed terrain into the pit to give a natural appearance. When necessary, borrow pits will be drained by open ditches to prevent accumulation of standing water.
TWE-15	C	Clean-up	The POD will include a Flagging, Fencing, and Signage Plan. Except for permanent survey markers and material that locate proposed facilities, stakes, pins, rebar, spikes, and other material will be removed from the surface and within the top 15 inches of the topsoil as a part of final clean-up. Fences on ROW will be removed where necessary and replaced to the original condition or better when the work is finished. Where existing fences are removed to facilitate the work, temporary fence protection for lands adjacent to the ROW will be provided at all times during the continuation of the Contract. Such temporary fence protection will be adequate to prevent public access to restricted areas. Temporary fencing constructed on the ROW will be removed by the Contractor as part of the clean-up operations prior to final acceptance of the completed work.
TWE-16	C	Site restoration and clean-up, water resources, land use	Watering facilities (tanks, natural springs and/or developed springs, water lines, wells, etc.) will be repaired or replaced, if damaged or destroyed by construction activities, to their pre-disturbed condition as required by the landowner or land management agency.
GEOLOGY AND SOILS			
TWE-19	C	Drainage, soil erosion control	The POD will include an Erosion Control Plan as part of the Stormwater Pollution Prevention Plan (SWPPP). Grading will be performed to provide adequate drainage around structure sites and sufficient clearance under conductors. Excavated material will be spread around the site where it was excavated. Topsoil will be piled separately and replaced after work completion.
GROUNDWATER, SURFACE WATER, AND WETLANDS			
TWE-20	P	Water quality	As part of the CWA 404 Permit for the TWE Project, the COM Plan will include a Water Resources Protection Plan, which will incorporate measures to avoid and minimize impacts to wetlands and waters of the U.S (WUS). to the extent practical. The POD will include a SWPPP. The Applicant will identify all streams in the vicinity of the proposed project sites that are listed as impaired under Section 303(d) of the CWA and develop a management plan to avoid, reduce, and/or minimize adverse impacts to those streams.

Table 3-1 Applicant-committed Impact Avoidance and Minimization Measures Directly and Indirectly Applicable to Conservation of Federally Listed, Proposed, and Candidate Species in the TWE Action Area

Draft EIS No.	Phase(s)[1]	Topic	Description
TWE-21	P	Water quality	The Applicant will obtain a National Pollutant Discharge Elimination System (NPDES) permit from the U.S. Environmental Protection Agency (USEPA) prior to construction.
TWE-22	C	Water quality	Runoff from excavated areas, construction materials or wastes (including truck washing and concrete washes), and chemical products such as oil, grease, solvents, fuels, and pesticides will be controlled. Excavated material or other construction material will not be stockpiled or deposited near or on stream banks, lake shorelines, ditches, irrigation canals, or other areas where runoff could impact the environment.
TWE-23	C	Water quality	Washing of concrete trucks or disposal of excess concrete in any ditch, canal, stream, or other surface water will not be permitted. Concrete wastes will be disposed of in accordance with all federal, state and local regulations.
TWE-24	C, O	Surface water, wetlands	Vehicle refueling and servicing activities will be performed in designated construction zones located more than 100 feet from wetlands and intermittent streams and more than 500 feet from perennial streams. Spill prevention and containment measures or practices will be incorporated as needed.
TWE-25	P	Dewatering	A dewatering permit will be obtained from the appropriate agencies if required for construction dewatering activities.
VEGETATION AND SOILS MANAGEMENT			
TWE-26	P, C	Vegetation management and noxious weeds	The POD will include a Reclamation Plan and a Noxious Weed Management Plan. The Reclamation Plan will address plant removal and selective clearing. The Noxious Weed Management Plan will be developed in accordance with appropriate land management agencies' standards, consistent with applicable regulations and agency permitting stipulations for the control of noxious weeds and invasive species (Executive Order [EO] 13112). Included in the Noxious Weed Management Plan will be stipulations regarding construction, restoration, and operation (use of weed-free materials, washing of equipment, etc.).
TWE-27	C	Vegetation management	In construction areas where re-contouring is not required, vegetation will be left in place wherever possible and original contour will be maintained to avoid excessive root damage and allow for re-sprouting.
TWE-28	C	Vegetation management, visual	Clearing will be performed so as to minimize marring and scarring the countryside and preserve the natural beauty to the maximum extent possible. Except for danger trees, no clearing will be performed outside the limits of the ROW.
ECOLOGICAL RESOURCES			
TWE-29	P, C	Ecological, special status species	The POD will include a Wildlife and Plant Conservation Measures Plan, which will identify important, sensitive, or unique habitats and BLM sensitive, USFS sensitive and state-listed species in the vicinity of the TWE Project. The POD will identify measures to be taken to avoid, minimize, or mitigate impacts to these habitats and species.
TWE-30	P	Ecological, raptors	In applicable areas, the TWE Project will be designed to meet or exceed the raptor safe design standards described in the *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* (Avian Power Line Interaction Committee [APLIC] 2006).
TWE-31	P, C, O	Ecological, special status species	Mitigation measures that will be developed during the consultation period with the BLM and the USFWS under Section 7 of the ESA will be adhered to, along with mitigation developed in conjunction with state authorities.
TWE-32	P, C, O, D	Ecological, special status species	Seasonal restrictions may be implemented in certain areas to mitigate impacts on wildlife. With the exception of emergency repair situations, the activities of ROW construction, restoration, maintenance, and decommissioning will be modified or discontinued in designated areas during sensitive periods (e.g., nesting and breeding periods) for candidate, proposed or listed threatened and endangered, or other sensitive animal species, as required by permitting agencies. Potential seasonal restrictions and avoidance buffers for nesting raptors will be identified in the

Table 3-1 Applicant-committed Impact Avoidance and Minimization Measures Directly and Indirectly Applicable to Conservation of Federally Listed, Proposed, and Candidate Species in the TWE Action Area

Draft EIS No.	Phase(s)[1]	Topic	Description
			Draft EIS. The Wildlife and Plant Conservation Measures Plan will incorporate the seasonal restrictions and stipulations contained in the federal agency RODs.
TWE-33	P, C	Ecological, special status species and habitats	Prior to the start of construction, the Applicant will provide training to all Contractor and Subcontractor personnel and others involved in construction activities where/if there is a known occurrence of protected species or habitat in the construction area. Sensitive areas will be considered avoidance areas. Prior to any construction activity, avoidance areas will be marked on the ground and maintained through the duration of the Contract. The Applicant will remove markings during or following final inspection of the Project.
TWE-34	C	Ecological, special status species and habitats	If evidence of a protected species not previously identified or known is found in the Project area, the Contractor will immediately notify the appropriate land management agencies and provide the location and nature of the findings.
LAND USE AND VISUAL RESOURCES			
TWE-45	P, C, O	Structure design and public safety	Structures and/or shield/ground wire will be marked with high-visibility devices where required by governmental agencies (Federal Aviation Administration [FAA]). Structure heights will be less than 200 feet, where feasible, to minimize the need for aircraft obstruction lighting.
TWE-46	P, C, O	Visual resources	The Applicant will comply with federal permitting agency stipulations regarding visual resources.
AIR QUALITY			
TWE-47	P, C	Air quality, dust control	The POD will include a Dust Control and Air Quality Plan. Requirements of those entities having jurisdiction over air quality matters will be adhered to and dust control measures will be developed. Open burning of construction trash will not be allowed unless permitted by local authorities.
PUBLIC HEALTH AND SAFETY			
TWE-53	P, C	Blasting	The POD will include a Blasting Plan, which will identify methods and mitigation measures to minimize the effects of blasting, where applicable. The Blasting Plan will document the proposed methods to achieve the desired excavations, proposed methods for blasting warning, use of non-electrical blasting systems, and provisions for controlling fly rock, vibrations, and air blast damage.
HAZARDOUS MATERIALS, WASTE, AND WASTEWATER MANAGEMENT			
TWE-57	P	Hazardous materials	As part of the POD, the Applicant will provide a Spill Prevention and Response Plan. The Plan will address compliance with all applicable federal, state, and local regulations, and will include: spill prevention measures, notification procedures in the event of a spill, employee awareness training, and commitment of manpower, equipment, and materials to respond to spills, if they occur.
TWE-58	P	Hazardous materials	As part of the POD, the Applicant will provide a Pesticide Use Plan as a component of the Noxious Weed Management Plan. The Plan will address compliance with all applicable federal, state, and local regulations.
TWE-59	P	Hazardous materials	As part of the POD, the Applicant will provide a Hazardous Materials Management Plan that has been approved by applicable federal, state or local environmental regulatory agencies. The plan will address on-site excavation of contaminated soils and debris and will include identification of contaminants, methods of excavation, personnel training, safety and health procedures, sampling requirements, management of excavated soils and debris, and disposal methods.
TWE-60	C	Waste management	No non-biodegradable debris will be deposited in the ROW. Slash and other biodegradable debris will be left in place or disposed of in

Table 3-1 Applicant-committed Impact Avoidance and Minimization Measures Directly and Indirectly Applicable to Conservation of Federally Listed, Proposed, and Candidate Species in the TWE Action Area

Draft EIS No.	Phase(s)[1]	Topic	Description
			accordance with agency requirements.
TWE-61	C, O	Hazardous materials, waste management	As part of the POD, the Applicant will provide a Hazardous Materials Management Plan. Hazardous materials will not be drained onto the ground or drainage areas. Totally enclosed containments will be provided for all trash. All construction waste including trash and litter, garbage, other solid waste, petroleum products, and other potentially hazardous materials will be removed to a disposal facility authorized to accept such materials.
TWE-62	C, O	Hazardous materials	If a reportable release of hazardous substance occurs at the work site, the Contractor will immediately notify the Applicant and all environmental agencies, as required by law. The Contractor will be responsible for the clean-up.
FIRE PROTECTION			
TWE-64	P, C	Fire, safety	The POD will include a Fire Protection Plan. The Applicant or its Contractor(s) will notify the BLM of any fires and comply with all rules and regulations administered by the BLM and USFS concerning the use, prevention, and suppression of fires on federal lands, including any fire prevention orders that may be in effect at the time of the permitted activity. The Applicant or its Contractor(s) may be held liable for the cost of fire suppression, stabilization, and rehabilitation. In the event of a fire, personal safety will be the first priority of the Applicant or its Contractor(s). The Applicant or its Contractor(s) will: • Operate all internal and external combustion engines on federally managed lands per 36 CFR 261.52(j), which requires all such engines to be equipped with a qualified spark arrester that is maintained and not modified; • Carry shovels, water, and fire extinguishers that are rated at a minimum as ABC-10 pound on all equipment and vehicles. If a fire spreads beyond the suppression capability of workers with these tools, all workers will cease fire suppression action and leave the area immediately via pre-identified escape routes; • Initiate fire suppression actions in the work area to prevent fire spread to or on federally administered lands. If fire ignitions cannot be prevented or contained immediately, or it may be foreseeable that a fire would exceed the immediate capability of workers, the operation must be modified or discontinued. No risk of ignition or re-ignition will exist upon leaving the operation area; • Notify the appropriate fire center immediately of the location and status of any escaped fire; • Review weather forecasts and the potential fire danger prior to any operation involving potential sources of fire ignition from vehicles, equipment, or other means. Prevention measures to be taken each workday will be included in the specific job briefing. Consideration will be given to additional mitigation measures or temporary discontinuance of the operation during periods of extreme wind and dryness; • Operate all vehicles on designated roads. Vehicle parking to be restricted to areas free of vegetation, on roads, or within the permitted ROW and designated work areas; • Operate welding, grinding, or cutting activities in areas cleared of vegetation within range of the sparks for that particular action. A spotter will be required to watch for ignitions; and • Use only diesel-powered vehicles in areas where excessive heat from vehicle exhaust systems could start brush or grass fires.

[1] Phase definitions: P-Planning, C-Construction, O-Operation, D-Decommission.

Table 3-2 Additional Impact Avoidance and Minimization Measures Directly and Indirectly Applicable to Conservation of Federally Listed, Proposed, and Candidate Species in the TWE Action Area

Final EIS No.	Description	Effectiveness
GENERAL WILDLIFE		
WLF-1	To minimize disturbance to migratory birds during the breeding and nesting season, no vegetation clearing or trimming, blasting, or other new surface-disturbing activities would occur during the avian breeding season as defined by Project Region and illustrated in Figures 3.22-5, 3.22-8, and 3.22-13 of the Final EIS. If avoidance of vegetation clearing during the nesting season is not possible, then a qualified biologist would conduct nest searches no more than 7 days prior to clearing and trimming activities. Active nests would be identified and protected in accordance with the following procedure. On lands administered by the BLM and USFS, spatial avoidance buffers and seasonal restrictions would be applied as required by applicable land and RMP stipulations (Appendix C). On federal lands for which there are no stipulations applicable to non-raptorial migratory birds, the habitat- or species-specific nest buffers recommended by the BLM Ely District (BLM 2012) would apply. Seasonal and spatial nest buffers that are more restrictive than the applicable required BLM and USFS plan stipulations and BLM Ely District recommendations would be applied at the discretion of local federal and state wildlife management agency biologists. Additionally, the BLM Ely District-recommended nest buffers would be applied to all other land jurisdictions in coordination with TransWest and respective landowners whose lands would be crossed by the Project.	This conservation measure would minimize disturbance to nesting migratory birds by limiting disturbance from construction and maintenance activities during critical breeding periods.
WLF-2	To minimize disturbance to nesting raptors, no vegetation clearing or trimming, blasting, or other new surface-disturbing activities would occur within the appropriate spatial buffer for an occupied nest during the breeding season of the species using it. Raptor breeding seasons vary widely based on species, weather conditions, prey availability, latitude, elevation, and other factors. Figures 3.22 5, 3.22-8, and 3.22-13 of the Final EIS present approximate raptor breeding seasons by species and Project region. If surface-disturbing activities within the appropriate spatial buffer cannot be avoided during the associated raptor nesting season, preconstruction raptor nest surveys and monitoring using agency-approved protocols would be performed to identify and protect occupied nests. Spatial avoidance buffers and seasonal restrictions would be applied as required by applicable BLM and USFS land and resource management plan stipulations (Appendix C) on lands administered by these agencies. Seasonal and spatial raptor nest buffers recommended by the USFWS and the appropriate state wildlife agency that are more restrictive than the applicable, required BLM and USFS plan stipulations would be applied at the discretion of these land management agencies (Table 3.22-4). Additionally, raptor seasonal and spatial buffers recommended by USFWS and the appropriate state wildlife agency would be applied to all other land jurisdictions in coordination with TransWest and respective landowners whose lands would be crossed by the Project.	This conservation measure would minimize disturbance to nesting raptors by limiting disturbance from construction and maintenance activities during critical breeding periods.
WLF-4	For the protection of migratory birds, TransWest would be required to install dark-sky lighting at all terminals, sub-stations, and series compensation facilities that is fully shielded to keep light from extending above the horizontal plane and is designed to provide the minimum amount of illumination necessary for safety and security purposes.	This conservation measure would minimize collision impacts to migratory birds which could be attracted by lighting at Project components.
WLF-5	In Audubon Important Bird Areas (IBAs) crossed by the 250-foot-wide transmission line ROW, TransWest would employ line marking as recommended in Reducing Avian Collisions with Power Lines: The State of the Art in 2012 (APLIC 2012). In addition, vegetation management level 3, as described in the Project Vegetation Management Plan, would be employed in IBAs crossed by the 250-foot-wide transmission line ROW.	This conservation measure would minimize impacts to habitat at Audubon IBAs. It also would minimize collision risk in areas of high avian use.

Table 3-2 Additional Impact Avoidance and Minimization Measures Directly and Indirectly Applicable to Conservation of Federally Listed, Proposed, and Candidate Species in the TWE Action Area

Final EIS No.	Description	Effectiveness
WLF-6	To minimize fragmentation impacts to forested habitats on public lands, TransWest would employ vegetation management Level 3, as described in the Project Vegetation Management Plan, to portions of the 250-foot-wide transmission line ROW located in forest and woodland habitat areas identified by local, federal, or state wildlife management agency biologists as being of particular importance to wildlife. In these areas, TransWest also would be required to leave downed woody debris greater than 3 inches in diameter (not including merchantable timber) in place to provide habitat for insects, small mammals, and other small prey species utilized by owls, raptors, and other predators. USFS Land and Resource Management Plans (aka Forest Plans) specify the amounts of down logs and woody debris to be left in logged areas. For instance, on USFS lands, five 8-foot-long logs 12 inches in diameter should be left per acre on average per stand in mixed conifer and spruce/fir habitats. In aspen habitats, five 8-foot-long logs 6 inches in diameter should be left on average per stand. Where possible, 10 tons of woody debris greater than 3 inches in diameter should be left on average per stand in mixed conifer and spruce/fir habitats and 3 tons per acre of woody debris greater than 3 inches in diameter should be left on average per stand in aspen habitats. Refer to applicable Forest Plans for detailed guidelines applicable other vegetation types.	This conservation measure would minimize impacts to wildlife species, their prey, and to forested habitats. USFS standards & guidelines specify the amount of down logs and coarse woody debris to be left in place as habitat for prey species. Following these guidelines will help to ensure that habitat for small animals is retained while providing for reasonable hazardous wildfire fuels reduction.
WLF-7	In Bird Habitat Conservation Areas (BHCAs), TransWest would employ line marking as recommended in Reducing Avian Collisions with Power Lines: The State of the Art in 2012 (APLIC 2012). In addition, vegetation management Level 3, as described in the Project Vegetation Management Plan, would be employed in BHCAs crossed by the 250-foot-wide transmission line ROW.	This conservation measure would minimize impacts to habitat in BHCAs. It also would minimize collision risk in areas of high avian use.
WLF-8	To minimize collision potential for avian species, TransWest would design the project to meet or exceed the standards described in the Reducing Avian Collisions with Power Lines: The State of the Art in 2012 (APLIC 2012).	This conservation measure would minimize avian collision potential.
WLF-10	To avoid or minimize long-term disturbance to wildlife associated with public use of the ROW and new access roads during Project operation, these roads would be closed or rehabilitated using methods and monitoring developed through consultation with the landowner or land management agency. Depending on facility and ROW maintenance needs, methods for closure could include gates, obstructions such as berms or boulders, or partial or full restoration to natural contour and vegetation.	This conservation measure would minimize impacts to sensitive wildlife species and their habitats by limiting public access. Limiting public access would decrease human disturbance to wildlife, particularly nesting birds, and prevent habitat degradation by humans and vehicles. This conservation measure also would reduce the potential for nest abandonment due to noise and human activity.
SPECIAL STATUS WILDLIFE		
SSWS-15	If evidence of a protected species not previously identified or known is found in the Project area, the Contractor will immediately notify the appropriate land management agencies and provide the location and nature of the findings. Construction in the vicinity of the newly located protected species would be halted and would resume when a biologist from the appropriate agency determines that the species would not be affected by continued construction.	This conservation measure would minimize impacts to special status species that may be encountered during construction along the 250-foot-wide transmission line ROW.
SSWS-16	To reduce impacts to federally listed wildlife species, TransWest would be required to obtain approval from the USFWS, lead agencies, and all applicable land management agencies prior to applying dust palliatives to	This conservation measure would minimize impacts to federally listed special status species that may be

Table 3-2 Additional Impact Avoidance and Minimization Measures Directly and Indirectly Applicable to Conservation of Federally Listed, Proposed, and Candidate Species in the TWE Action Area

Final EIS No.	Description	Effectiveness
	construction areas located within areas designated as suitable habitat for federally listed species.	adversely impacted by the application of dust palliatives within the 250-foot–wide transmission line ROW during construction and decommissioning.
AQUATIC BIOLOGICAL RESOURCES		
AB-1	(Fish Passage): When avoidance of perennial streams with fish populations is not feasible and a culvert is required during construction, flow would be maintained in a portion of the stream to allow unrestricted fish passage. Any plan for dewatering the stream at the culvert site must be approved by the appropriate federal and state agencies. Culvert size and type would be selected to facilitate the continued and long-term connectivity and movement of target aquatic species. If the culvert is proposed to be in place during project operation, approval must be obtained from the federal or state agency management authority. An alternative crossing method may be required.	This conservation measure would be highly effective in maintaining fish movement through the construction area.
AB-2	(Avoid Game Fish Spawning Periods): If spawning areas for game fish species are known to occur at streams proposed for vehicle crossing or culvert construction, instream disturbance would be scheduled to avoid the spawning period. The exact dates for avoidance would be determined through discussions with Wyoming Game and Fish Department (WGFD), Colorado Parks and Wildlife (CPW), Utah Division of Wildlife Resources (UDWR), or USFS. All disturbed areas would be restored to pre-construction conditions prior to the next spawning season.	This conservation measure would be highly effective in avoiding impacts on game fish spawning.
AB-3	(Invasive Aquatic Species Protection): It is assumed that any waterbody could contain aquatic invasive species and invasive weed species. If work occurs in or near a waterbody, all equipment would be decontaminated. Decontamination would occur before arrival at a project site to avoid the transfer of aquatic invasive species from a previous work site in or near water. Decontamination would consist of either of these actions: 1) drain all water from equipment and compartments; clean equipment of all mud, plants, debris, and aquatic organisms; and dry equipment for specified time by season (5 days in June through August, 18 days in March through May, and 3 days in December through February when temperatures are at or below freezing); or 2) use a high pressure (2,500 pounds per square inch [psi]) hot water (140 degrees Fahrenheit [°F]) pressure washer to thoroughly clean equipment and flush all compartments that may hold water. A field monitor would be present to ensure that the cleaning was completed prior to vehicle and equipment moving to other streams and drainages.	This conservation measure would be highly effective in avoiding the transfer of invasive aquatic species due to the cleaning technique.
AB-4	(Herbicide Use Plan): As part of vegetation management, the applicant would prepare an Herbicide Use Plan. The Plan would identify a list of approved herbicides that may be used as well as locations of areas that may be treated. Licensed herbicide applicators would be used in the treatment process. All herbicides would be used in accordance with label instructions for the chemical. The Plan also would discuss compliance with applicable federal, state, and local agencies.	This conservation measure would be highly effective in avoiding toxic effects of herbicide use on aquatic species.
SPECIAL STATUS AQUATIC RESOURCES		
SSS-1	(Sediment Protection for Streams with Federally listed and Special Management Fish Species): Mitigation measure **WR-3** would be applied to perennial streams providing habitat for federally listed fish species or fish species requiring special management as mandated by existing federal land use plans. The measure would require coordination with the federal agencies having land jurisdiction. This coordination would include location and design of access roads and temporary work areas within 300 feet of streams providing habitat for these	This conservation measure would be highly effective in avoiding or minimizing sediment effects to streams with federally listed or special management fish species.

Table 3-2 Additional Impact Avoidance and Minimization Measures Directly and Indirectly Applicable to Conservation of Federally Listed, Proposed, and Candidate Species in the TWE Action Area

Final EIS No.	Description	Effectiveness
	species to minimize erosion and sedimentation effects. The agencies would coordinate and provide input to TransWest for potential modification of locations and designs within TransWest's final engineering schedule.	
SSS-2	(Avoidance of Water Withdrawal and Entrainment/Impingement Effects for Federally Listed Fish Species): Where critical habitat for the Colorado River federally endangered fish species cannot be avoided as water sources for construction purposes, TransWest would be required to obtain approval from the USFWS and state or federal agencies responsible for managing the land and critical habitat areas. Agency approval would ensure that water withdrawal methods would avoid or minimize entrainment or impingement effects to early life stages of endangered fish species. Requirements for water pumping in critical habitat areas would include: 1) avoidance of pumping between approximately April 1 through August 31, with specific dates dependent upon the water year; 2) intake hoses would be screened with 3/32-inch mesh size; 3) intake velocity would not exceed 0.33 feet/second in an area where larval stages of the federally endangered fish may be present; and 4) pumping from off-channel locations (i.e., no connection to the river during high spring flows) would use an infiltration gallery constructed in a USFWS-approved location. Additional guidance on pumping methodology is provided in the NMFS's (1997) document entitled Fish Screening Criteria for Anadromous Salmonids.	This conservation measure would be highly effective in avoiding the entrainment or impingement effects on federally listed fish species in their critical habitat areas.
SSS-3	(Avoidance of Water Withdrawal and Entrainment/Impingement Effects for Conservation Agreement Fish Species): Where streams containing conservation agreement fish species (bluehead sucker, Bonneville cutthroat trout, Colorado River cutthroat trout, flannelmouth sucker, southern leatherside chub, and Virgin River spinedace) cannot be avoided as construction water sources, approval must be obtained from federal, state, and/or land management agencies regarding water withdrawal sites and methods. A site specific withdrawal plan would be prepared by TransWest for review/approval by the agencies. Requirements for water pumping for hose screening and intake velocities would be the same as identified in mitigation measure **SSS-1**. Additional requirements include the use of private, off-stream water sources if possible; withdrawal sites must be reviewed/approved by applicable agencies; and approval should include provisions to maintain adequate instream flows to protect aquatic species and their habitat.	This conservation measure would be highly effective in providing management direction to avoid water withdrawal in habitat occupied by conservation agreement fish species.
SSS-4	(No Permanent Structures or New Roads in Critical Habitat for Federally Listed Fish Species): No permanent structures or new roads would be constructed in critical habitat for federally endangered fish species. Any temporary disturbance to soils in the 100-year floodplain within critical habitat would be minimized to the extent possible and restoration would be completed to maintain existing conditions. TransWest would avoid siting temporary facilities such as staging areas and helicopter pads in the 100-year floodplain that is designated critical habitat. Additionally, TransWest would avoid temporary river crossings by vehicles within designated critical habitat.	This conservation measure would be highly effective in avoiding direct disturbance to critical habitat for Colorado pikeminnow in Regions I and II and razorback sucker in Region II.
SSS-11	(No Vehicle Crossings or New Roads in the Muddy River): No vehicle crossings or new roads would be constructed for the Muddy River. This measure would protect habitat for Virgin River chub by avoiding habitat alteration or loss.	This conservation measure would be highly effective in avoiding direct disturbance to habitat for special status fish species in the Muddy River.

Table 3-2 Additional Impact Avoidance and Minimization Measures Directly and Indirectly Applicable to Conservation of Federally Listed, Proposed, and Candidate Species in the TWE Action Area

Final EIS No.	Description	Effectiveness
WATER RESOURCES		
WR-3	As part of the ROW grant and prior to the Notice to Proceed, TransWest would consult with federal agencies having land jurisdiction regarding location and design of access roads and temporary work areas near impaired streams to avoid erosion and sedimentation effects. The proposed design and location of new and upgraded access roads and temporary work areas within watersheds (Hydrographic Unit Code HUC]10) containing sediment- or ion-impaired waters (according to 303(d) lists) would be provided by TransWest to the agencies upon completion of conceptual design of these facilities. The agencies would coordinate and provide input (as deemed applicable by the agencies) to TransWest for modification of locations and designs within TransWest's final engineering schedule to prevent the Project from contributing additional sediment to impaired waters.	Consultation with agencies would encourage the consideration of best-science tools and local information, thus maximizing the final design process.
VEGETATION AND WETLAND RESOURCES		
NX-1	The Noxious Weed Management Plan to be developed as part of the COM Plan would include the following: 1. Pre-construction surveys for noxious weeds in the footprints of the ROW, access roads, and ancillary facilities; 2. Pre-construction weed control; 3. Education of construction and operation personnel in each Project region; 4. Washing of vehicles and equipment before entering and leaving the ROW; 5. Herbicide spraying; and 6. Annual monitoring and reporting. Survey information collected during pre-construction surveys would include species name, global positioning system location of weed infestations, percent cover, and approximate size of weed infestations. Control of noxious and invasive species could include chemical, physical, and biological methods and would be developed in consultation with the land agencies and private landowners. The plan would identify species of concern for each BLM FO and USFS and focus monitoring and control methods on these species. The plan would comply with the existing BLM, USFS, USFWS, state, and federal regulations concerning noxious weed management. Post-construction annual monitoring would be determined with the appropriate land management agencies.	This conservation measure would minimize impacts to potential special status species habitat.
NX-2	Herbicide spraying would be conducted following all applicable state and federal laws regarding chemical use, adverse weather, chemical storage, and chemical drift. Further guidelines and protocols for herbicide spraying on BLM land are provided in the Final BLM Vegetation Treatment Using Herbicides Programmatic EIS (BLM Vegetation EIS) (BLM 2007). Standard operating procedures for herbicide spraying include buffers for sensitive areas such as riparian and wetland areas and threatened and endangered species habitat, timing restrictions, and safety protocols.	This conservation measure would minimize impacts to habitat for listed, proposed, and candidate plant, wildlife, and aquatic species.

Table 3-2 Additional Impact Avoidance and Minimization Measures Directly and Indirectly Applicable to Conservation of Federally Listed, Proposed, and Candidate Species in the TWE Action Area

Final EIS No.	Description	Effectiveness
NX-3	On lands managed by the BLM, an approved Pesticide Use Proposal (PUP) would be obtained from each BLM FO prior to herbicide spraying. PUPs would have site-specific information about the herbicides to be used. The PUPs and associated reporting requirements would be submitted on the schedule required for each BLM FO. Herbicide spraying in desert tortoise habitat in Nevada would require consultation with the BLM and USFWS.	This conservation measure would ensure that coordination occurs with local agency personnel with site- and species-specific expertise and jurisdictional authority. As such, it would minimize impacts to habitat for local populations of federally listed, proposed, and candidate plant, wildlife, and aquatic species.
NX-4	The cut-stumps of mature salt cedar stands that are cut as part of vegetation clearing will be immediately painted with herbicides. The specific control methods and herbicide to be used would be determined in consultation with the Nevada BLM State and FOs. Additional control measures could include the planting of native or desired plant species following treatment to provide erosion control, and the use of biocontrols.	This measure would improve the control and management of salt cedar stands that are to be cleared as part of the construction and maintenance activities. Coordination with appropriate BLM State and FOs is critical for ensuring that tamarisk removal does not adversely affect listed species that may use these areas as habitat (e.g., southwestern willow flycatcher).
VG-1	Native seed mixes to be used for reclamation would be developed in consultation with the land managers for the various regions crossed by the Project. Seed mixes would meet the requirements of the individual agency FO's crossed by the Project. Site-specific seed mixes for soils with low reclamation potential (LRP) would be developed. The LRP seed mixes would be specifically designed for alkaline, saline, or sodic soils and would be used in areas where reclamation would potentially be difficult based on soil conditions. Additional soil amendments may be required in these areas, and would be implemented at the direction of the land manager. Reclaimed areas would be monitored annually by the applicant to ensure successful reclamation is occurring. The length of time for the annual monitoring, and the definition of successful reclamation would be determined by the appropriate land management agency. Subsequent actions in areas without successful reclamation would be determined in consultation with the appropriate land management agency.	Implementation of this measure would mitigate impacts to saltbush communities and other areas that may be difficult to reclaim to pre-disturbance native vegetation conditions. The clearing of pinyon-juniper woodland would be determined through consultation with the land management agencies and surface land owners.
VG-3	A vegetation reclamation and monitoring plan will be developed as part of the POD. The reclamation monitoring plan would define reclamation success for each vegetation type and management agency, list reclamation seed mixes, and detail reclamation monitoring for both interim and final reclamation. Interim and final reclamation success would be monitored quarterly for the first year, and then annually for at least 3 years, or until reclamation success as defined by each land management agency crossed by the project is achieved. Reporting of construction, reclamation progress, and monitoring results would be submitted to each land management agency per each office's reporting requirements.	Implementation of this measure would assist in ensuring post-reclamation success through monitoring and reporting of reclamation results. Impacts to each vegetative community would occur in less than 1 percent of the total of each vegetative community in the analysis area.
VG-4	During vegetation clearing, if chipping and spreading woody material in the ROW, wood chips will not exceed 3 inches in depth. Distribute chips in discontinuous patches that do not result in a continuous chip mat (<40% of surface covered by 3 inches of chips).	Implementation of this measure would mitigate impacts to soil and vegetation resources from the spreading of chipped material in the ROW as part of vegetation clearing activities.

Table 3-2 Additional Impact Avoidance and Minimization Measures Directly and Indirectly Applicable to Conservation of Federally Listed, Proposed, and Candidate Species in the TWE Action Area

Final EIS No.	Description	Effectiveness
VG-5	Masticated material spread in the ROW will not exceed a depth of 3 to 6 inches. Distribute material in discontinuous patches that do not result in a continuous chip mat (<40% of surface covered 3 to 6 inches thick).	Implementation of this measure would mitigate impacts to soil and vegetation resources from the spreading of masticated material in the ROW as part of vegetation clearing activities.
WET-1	Wetland surveys would be conducted at terminal, ROW, ancillary facilities, and along proposed access roads corridors to identify wetland, WUS, and riparian areas located in these areas. Survey information collected would include wetland type, type and cover of hydrophytic and riparian vegetation species present, soil characteristics, site hydrology, global positioning system location of the wetland, and associated information required to determine jurisdictional status. Based on survey results, no surface disturbance including temporary and permanent facilities, the placement of fill material or vegetation clearing for storage, parking, construction activities, or construction work areas as feasible will occur within the avoidance buffer, or surface use restriction defined in the resource management plan for each BLM FO and USFS national forest. If avoidance is not feasible, U.S. Army Corps of Engineers (USACE), BLM, USFS, and USFWS crossing and construction techniques for wetlands and riparian areas will be employed. The wetland crossing and construction techniques will be approved by the USACE, BLM, USFS, and USFWS and will be outlined in the Final POD.	Implementation of conservation measures **WET-1** through **WET-3**, in conjunction with design feature TWE-20, would mitigate impacts to wetlands and riparian areas through identification and mapping of wetlands, riparian areas, and drainages and the avoidance of surface disturbance in these areas. These measures would minimize impacts to a several listed wildlife and plant species that use wetland and riparian habitats.
WET-2	For any features identified during field surveys as jurisdictional under the USACE and USEPA guidance under Section 4 of the CWA, consultation with the USACE will occur prior to construction. Mitigation for these features will be determined in consultation with the USACE and BLM.	
WET-3	Access roads will be routed around riparian areas, wetlands, intermittent or perennial drainages, and ephemeral channels to the extent practical. If jurisdictional wetlands or WUS cannot be avoided, USACE approved construction techniques for construction in wetlands and WUS will be applied. BLM and USFS construction techniques for non-jurisdictional wetlands, riparian areas, intermittent drainages, and ephemeral channels would be applied on BLM and USFS lands, as appropriate. These include the use of timber mats, erosion controls, and the placement of equipment outside of the wetland, riparian areas, intermittent drainages, and ephemeral channels boundaries.	

Table 3-2 Additional Impact Avoidance and Minimization Measures Directly and Indirectly Applicable to Conservation of Federally Listed, Proposed, and Candidate Species in the TWE Action Area

Final EIS No.	Description	Effectiveness
SPECIAL STATUS PLANT RESOURCES		
SS-1	(Species-specific Surveys) – Species requiring surveys would be identified by the BLM and Western in consultation with the appropriate agency. For the species that are identified as requiring surveys, site- and species-specific surveys would be conducted. The timing and methodology of the surveys would be determined by the BLM in consultation with the appropriate agency and the Applicant. Surveys would be conducted in areas identified as potential habitat through models developed for the EIS, or from agency-provided models for specific species. If individuals or populations are identified during surveys in potential habitat areas, species-specific avoidance through structure and ROW design modifications would be developed and implemented. For species that cannot be avoided, species-specific mitigation would be developed in consultation with the appropriate agency and BLM. Species-specific mitigation may include compensatory mitigation, and transplanting of individuals. For federally listed species, the species-specific mitigation would be identified as conservation measures in the Biological Assessment. For USFS Sensitive species, the species-specific mitigation would be described in the Biological Evaluation (BE).	With implementation of conservation measure **SS-1**, in addition to TransWest's design features and the WWEC BMPs, no direct impacts to special status plant species and their associated suitable habitats are anticipated. If species or habitat avoidance remains infeasible, impact minimization and mitigation measures would be developed in consultation with the BLM, Western, USFWS, and USFS prior to construction.
SS-3	Construction would occur downslope of special status plants and populations where feasible; if surface disturbance must be sited upslope, erosion controls would be implemented at the direction of the BLM, USFS, or USFWS, as appropriate, to prevent sedimentation and erosion from upslope surface disturbance. Additional buffer distances greater than the minimum 300-foot buffer distance described in mitigation measure **SS-4** may be required.	With implementation of conservation measure **SS-3**, erosion and sedimentation impacts to special status species would be minimized through Project design, avoidance buffers, and erosion controls.
SS-4	A minimum 300-foot buffer distance would be established between federally listed individuals and populations and surface disturbance. Avoidance areas would be visible during construction through fencing, signing, rebar, etc. during construction. Construction and operation traffic would stay on designed routes, and other cleared or approved areas.	Implementation of conservation measure **SS-4** would minimize impacts to federally listed individuals and populations through the use of avoidance buffers.
SS-5	The Dust Control and Air Quality Plan would include dust abatement measures to minimize impacts to special status plant species; including use of slower speed limits on unpaved roads, gravel on roads in occupied habitat and avoidance areas, and the application of water for dust abatement.	Implementation of conservation measure **SS-5** would mitigate impacts to special status species resulting from fugitive dust.
SS-6	Prior to vegetation management activities, including vegetation removal, herbicide use, and off-road vehicle access, within federally listed occupied habitat, the applicant will coordinate with the USFWS and BLM to minimize impacts to federally listed species.	Implementation of conservation measure **SS-6** would mitigate impacts to special status species resulting from vegetation management.
SS-9	(Avoidance of High Quality Habitats) – In instances where complete habitat avoidance is not possible due to topographical, biological, or engineering constraints, all "high quality" habitats as determined during site- and species-specific surveys would be avoided by all direct disturbances during construction and operational activities. High quality habitat are defined as areas that are within the geographic range of the species, have been field-verified as having the majority of required habitat characteristics; and/or the species has been observed in the immediate vicinity, resulting in high occurrence potential for the identified species.	Implementation of conservation measure **SS-9** would reduce impacts to special status species resulting from loss of suitable habitat. Conservation of high quality habitat in the action area would facilitate the maintenance and recovery of listed species.

1

4.0 Information Sources, Definitions, and Consultation History

4.1 Information Sources

Information regarding federally listed, candidate, and proposed species and their habitat within the Action Area was obtained from a review of existing published and unpublished sources, agency reports, field surveys, species range information obtained from the USFWS Ecological Conservation Online System (ECOS) website and Information, Planning, and Conservation (IPaC) System, and species occurrence data obtained from the Wyoming Natural Diversity Database (WYNDD), Colorado Natural Heritage Program (CNHP), Utah Natural Heritage Program (UNHP), and Nevada Natural Heritage Program (NNHP). In addition, agency input on species occurrence within the Action Area was provided through participation in the BRTG, which involved monthly conference calls to discuss the Project and associated biological resource issues.

Field surveys were conducted for desert tortoise and Utah prairie dog to determine species presence and habitat within the Action Area. Because final engineering and facility micro-siting will not be completed unless the Project is approved, surveys have not been conducted for the other listed, candidate, and proposed species with potential to occur along the transmission line route. Should the Project be approved, TransWest would conduct detailed habitat analyses and/or species-specific surveys for listed, proposed, and candidate species likely to be affected by the Project prior to final design and micro-siting of towers and ancillary facilities and/or preconstruction clearance surveys immediately prior to construction. Species-specific survey needs are identified in Chapter 6.0 of this BA. For plant species, pre-construction surveys would occur during the appropriate flowering period for the species immediately prior to or during the year in which construction is initiated. Similarly, pre-construction wildlife surveys would occur in the appropriate survey window just prior to start of construction. The results of the surveys would be used to avoid and minimize impacts to listed, proposed, and candidate species through micro-siting of proposed facilities, changes to timing of construction and operations and maintenance activities, or to determine the level of unavoidable impacts, including potential take of listed species. All pre-final design and pre-construction clearance survey efforts would be carried out by qualified biologists and botanists in coordination with the USFWS, BLM, Western, applicable land management agencies, and private land owners, as appropriate. For species without complete or current occurrence data within the action area, this BA takes a conservative, programmatic approach and assumes that modeled potentially suitable habitat is occupied. Project effects to these species are therefore based on whether and the extent to which modeled habitat would be affected by proposed facilities.

For the purposes of this BA, wildlife species lacking agency-developed/approved habitat models and for which Project-specific field surveys have not been conducted have had their habitats modeled by AECOM using a geographic information system (GIS). These habitat models are based on each species known geographic range and habitat association. Northwest Regional Gap Analysis Project (NWReGAP) and Southwestern Regional Gap Analysis Project (SWReGAP) land cover data provided the vegetation base layer that was used to determine the distribution and extent of upland wildlife species' potential habitats. These datasets were determined to be inadequate for identifying riparian and wetland species' potential habitats. For those species, National Wetlands Inventory (NWI) data and/or the National Hydrographic Dataset (NHD) were used to identify and map potential habitat. For plant species carried forward in the BA, with the exception of the Ute ladies'-tresses orchid, all habitat models were developed by the USFWS and/or the BLM. The Ute ladies'-tresses habitat model was developed by AECOM based on habitat parameters provided by the USFWS. The model was further refined based on comments from the USFWS and BLM.

4.2 Direct Effects

As described in Section 2.2, the action area for the proposed action is based on the following components of the Final EIS Agency Preferred Alternative: 1) transmission line refined corridor with a preliminary engineered alignment and 250-foot transmission line ROW centered on the alignment; 2) access roads and temporary work areas (which may be sited up to 1 mile from the preliminary engineered alignment); 3) ground electrode sites; and 4) the northern and southern terminals. Because the actual location of project facilities involving temporary work areas, terminal locations, electrode bed sites, and access roads have not been determined at this time, TransWest has provided acreages and assumptions for these facilities. Siting areas were provided for the terminals and ground electrode systems. Final engineering design will be completed following the ROD and prior to the BLM Notice to Proceed.

As per the Endangered Species Consultation Handbook (USFWS and NMFS 1998), under Section 7 of the ESA, direct effects of a proposed action refer to the immediate effects of the project on a listed species or its habitat. In this BA, direct effects include short-term construction-related impacts associated with temporary use areas that would be reclaimed and revegetated following construction. These would include cleared and graded areas around tower bases, other work areas within the ROW, as well as concrete batch plants, material storage yards, stringing and tensioning sites, and other facilities as described in Chapter 2.0 of this BA. Both short- and long-term direct effects to listed, proposed, and candidate species and their habitats would occur during construction as a result of clearing and grading new access roads, removing vegetation over 6 feet in height from the ROW, constructing transmission tower structures and constructing the ground electrode systems and terminals. Long-term direct effects also include activities associated with the operation and maintenance phase of the Project. These activities include increased human presence resulting in species disruptions and disturbance to habitat from vegetation maintenance.

Direct effects also may include the effects of interrelated actions and interdependent actions. Interrelated actions refer to activities that are part of the proposed action and depend on the proposed action for their justification. For the Project, an example of an interrelated action would be the soil borings required for the geological hazard analysis and geotechnical testing. These investigations would take place prior to final engineering design and facility micro-siting and would have potential to affect some of the species analyzed in this BA. Interdependent actions are actions that have no independent utility apart from the action under consultation. There are no interdependent actions associated with the Project.

4.3 Indirect Effects

Indirect effects of a proposed action are caused by or result from the proposed action and occur later in time but are reasonably certain to occur. For the Project, indirect effects to listed species and their habitats have potential to result from the transmission line augmenting nesting and perching sites for ravens and raptors. Increased concentrations of these species might then result in increased predation of listed species in these areas. Another source of indirect effects (as well as direct effects) to listed species is water depletions. Potential water depletions to the Platte and Colorado River systems associated with dust control and the production of concrete for facility footings and foundations could occur during construction. Depending on the amount and location of withdrawal, these depletions could have an indirect effect on habitat quality for downstream species later in time from when the withdrawal occurred.

4.4 Cumulative Effects

Under the ESA, cumulative effects include future non-federal (i.e., state, tribal, local, or private) activities that are reasonably certain to occur within the action area (50 CFR 402.02), and would have potential to affect one or more of the same species that would be affected by the proposed action. For this BA, future non-federal activities on private and state lands were identified through direct contact with state and local governments with jurisdiction over lands crossed by the proposed action. In addition, state, county, and

city websites were reviewed for information on future activities identified for these lands. The area for the information search for future non-federal activities comprised an approximately 4-mile-wide corridor centered on the preliminary engineered alignment (i.e., the TWE Draft EIS 2-mile-wide corridor buffered by 1 mile on either side). This area was expanded for some species to include critical habitat that could be affected by construction water use. Very little information was found on non-federal activities within the TWE Action Area.

4.5 Consultation History

As the lead federal agencies for the TWE Project EIS, the BLM and Western were signatories for a Section 7 Consultation Agreement along with cooperating agencies including the Bureau of Reclamation, Bureau of Indian Affairs, USFS, USACE, and USFWS. The Agreement was signed in March 2013.

Numerous informal activities have been completed to meet the ESA Section 7 consultation requirements for the Project. These activities involved meetings, phone calls, and e-mails among the lead agencies, USFS, USFWS, and AECOM regarding issues related to federally listed, proposed, and candidate species; monthly BRTG calls; and review of USFWS information related to species occurrences with the action area, survey protocols, contents of the BA, and conservation measures.

The following list highlights the key informal consultation activities for the TransWest Transmission Project:

- An informal request was made to the USFWS Colorado, Nevada, Utah, and Wyoming State Offices by Environmental Planning Group (EPG) to confirm a list of federal species for the Energy Gateway South and TransWest Transmission projects.
- USFWS identified the federal listed, proposed, and candidate species that may be present in the proposed project areas for the Energy Gateway South and TransWest Transmission projects in a letter dated August 23, 2009.
- A biological resources coordination meeting was held on January 19, 2010 at the BLM Wyoming State FO, with participants from the BLM, USFWS, and AECOM. The purpose of the meeting was to define the coordination and communication process and develop special status species lists including federally listed species.
- USFWS identified the federally listed, proposed, and candidate species that may be present in the proposed project area for the TWE Project in a letter dated August 25, 2010.
- BLM and AECOM compiled occurrence information for the federally listed, proposed, and candidate species and incorporated these data with the areas associated with the proposed project facilities. Based on this mapping effort, the initial USFWS species list was modified.
- Feedback on the modified species list and occurrences within the project area was obtained from the USFWS and other cooperating agencies through the BRTG process and reviews of the Preliminary Draft EIS (PDEIS) and Draft EIS. Monthly BRTG phone discussions were conducted from August 2009 through April 2014. The 2009 BRTG calls involved discussions for both the TransWest Express Transmission and Energy Gateway South projects. Starting in January 2010, the BRTG calls were held separately for both projects.
- AECOM prepared a survey protocol document that described the survey methods to be used for special status species including federal listed, proposed, and candidate species (AECOM 2012). Feedback was obtained through BRTG calls and document reviews. A final survey protocol document was completed in April 2012. Additional detail on the survey schedule for each species was added in 2013 and 2014.
- Habitat modeling was completed for the federally listed, proposed, and candidate plant species as part of the species occurrence analysis. Details on the habitat modeling methodology and results are presented for the plant species discussions in Section 6, Environmental Baseline and

Assessment Effects. As stated in section 3.1 above, the USFWS provided or was integrally involved in the review and approval of GIS models used to identify potential habitat and analysis areas for listed plant species carried forward in the BA.

- An impact assessment approach document was prepared by the USFWS's Colorado, Nevada, Utah, and Wyoming FOs for three riparian species (Ute-ladies tresses orchid, western yellow-billed cuckoo, and southwestern willow flycatcher) for the Agency Preferred Alternative, as identified in the PDEIS, Version 2. The document that was provided to the BLM on June 27, 2013, described information that would be needed to complete impact analyses for these three riparian species.
- A January 21, 2014, meeting was held to discuss the BA outline and the species to be carried forward into the BA analysis. The USFWS provided an updated list of species analyzed in the BA on February 21, 2014.
- BLM, AECOM, and the USFWS discussed existing protection measures and additional proposed conservation measures as part of the impact evaluations for species.
- AECOM met with USFWS Utah FO to discuss and finalize analysis areas for listed species in Utah.
- Following the change in the Agency Preferred Alternative in September 2014, AECOM revised the list of species to be carried forward in the BA. BLM submitted the revised list to USFWS on October 27, 2014. On October 31, 2014, USFWS confirmed the proposed changes to the list, identified an additional change, and advised the BLM regarding the proposed rule establishing critical habitat for the western yellow-billed cuckoo.

5.0 Deconstructing the Action

The following sections identify general impacts to vegetation and wildlife associated with each of the project components and phases described in Chapter 2.0. This text has been developed to assist the USFWS in understanding the different types of impacts that federally listed, EXP/NE, and candidate species could incur as a result of Project implementation.

5.1 Plants

5.1.1 Pre-construction Activities

5.1.1.1 Environmental Surveys

Environmental surveys, including special status species surveys, noxious weed surveys, wetland delineations, and cultural and paleontological resources investigations, would be conducted in the approved ROW, refined transmission corridor, and potential disturbance area, as needed, following approval of the Proposed Action and issuance of the Project RODs. Special status plants found during these survey efforts would be recorded via global positioning system (GPS) for use in final Project design and construction planning. Engineering surveys and other environmental surveys that would occur within modeled or potential habitat for any listed plant species would be preceded by habitat assessments and, if necessary, species-specific surveys conducted using USFWS-approved protocols. Habitat assessments would be conducted by qualified botanists capable of verifying the presence or absence of suitable habitat in areas modeled as potential habitat for a listed species. Verified suitable habitats would then either be avoided or, if complete avoidance is not feasible, species-specific surveys would be conducted in areas with potential to be affected by Project activities. In accordance with the general conservation measures described in Chapter 3.0 and species-specific measures described in Chapter 6.0, any listed plant species individuals or populations found during these survey efforts would be mapped and avoided during subsequent environmental or engineering survey efforts, geotechnical investigations, and Project construction.

5.1.1.2 Engineering Surveys

Like the environmental surveys described above, engineering surveys would take place following issuance of the Project RODs. As stated above, engineering surveys that would have potential to adversely affect verified suitable habitat for federally listed plant surveys would be preceded by species-specific surveys conducted by qualified individuals using USFWS-approved protocols. Subsequent engineering surveys in these areas would avoid impacts to suitable habitats and/or extant individuals or populations of listed plant species that had been mapped and flagged or fenced in accordance with USFWS and the appropriate federal land management agency input following completion of the habitat assessment and/or species-specific surveys.

5.1.1.3 Geotechnical Investigations

Geotechnical investigations would result in ground disturbance associated with accessing testing sites (i.e., proposed and alternate transmission tower locations) and boring test holes in these areas. Geotechnical investigations would take place following the environmental and engineer surveys described above. Consequently, the locations of any suitable habitat and individuals or populations of federally listed plant species with potential to be affected by these activities would be known prior to initiating geotechnical fieldwork. Potential impacts to these areas would then be avoided by siting access roads, project facilities, and associated geotechnical sampling sites away from these individuals and populations. Implementation of Applicant-committed measures TWE-8 and TWE-47 would control the generation of fugitive dust in sensitive areas, thereby minimizing potential indirect impacts to special status plants resulting from Project-related dust deposition.

5.1.1.4 Impact Avoidance and Minimization during Pre-construction Surveys

Implementation of the applicant-committed design features and mitigation measures and additional conservation measures listed in **Table 2-7** and described in Chapter 3.0 would avoid and minimize impacts to federally listed plant species. Measures relevant to pre-construction surveys include but are not limited to: TWE-1, TWE-2, TWE-3, TWE-4, TWE-5, TWE-22, TWE-26, TWE-29, TWE-31, TWE-34, TWE-47, TWE-64, NX-1, SS-1, and SS-5.

5.1.2 Construction Activities

5.1.2.1 Transmission Line

Construction-related surface-disturbing activities would occur in the 250-foot-wide transmission line ROW, the refined transmission corridor, and at ancillary facilities. Within the ROW, surface-disturbing activities would consist of ROW clearing, installation of transmission line structures and wires, and construction of temporary use (e.g., concrete batch plants) and long-term use (e.g., fiber optic regeneration stations) facilities.

Direct surface disturbing impacts to vegetation would include the trampling/crushing of vegetation, the removal of vegetation, and soil compaction. Indirect effects to vegetation could include increased erosion, sedimentation, fugitive dust generation, the potential spread and establishment of noxious and invasive weed species, and habitat fragmentation.

Vegetation clearing in the ROW during construction would occur as described in the ROW Preparation and Vegetation Management Plan (Appendix R of the POD). The development of a Vegetation Management Plan is a requirement of NERC reliability standard FAC 003 02. NERC reliability standard FAC-003-2 is focused on preventing vegetation-related outages from occurring on transmission lines. TransWest's vegetation management program was developed in accordance with NERC Reliability Standards and is described below.

Vegetation Management

The vegetation management program is composed of three distinct vegetation management levels to be implemented based on resource concerns and management requirements along the ROW. Level 1 would be applied to the majority of the ROW while Levels 2 and 3, due to their increased initial and long-term maintenance costs, would only be applied to areas identified as sensitive based on biological, cultural, visual, or other characteristics. The definitions and specific details of the individual management levels are explained in Appendix R of the POD, including outlines of which of the three vegetation management levels would be applied in various vegetation community types. Vegetation management levels would be applied during both construction and operation activities.

For all three vegetation management levels, vegetation removal techniques would be similar. Trees to be cleared would be cut off at ground level, and the stumps left in place for erosion control. Vegetation would be removed using mechanical means appropriate for the area. Slash would be removed from the ROW or chipped and spread according to approved land agency practices. Vegetation debris and density would be assessed to determine wildfire risks and additional mitigation. Depending on access needs during construction activities, the remaining vegetation not removed during clearing would be driven over. This practice would leave the root stock and topsoil in place in the majority of the ROW. TransWest's three vegetation management levels are described below.

Level 1 – Standard ROW Vegetation Management

Level 1 would be applied to the entire ROW except for areas identified as highly sensitive and critically sensitive, such as riparian areas and verified suitable habitat for listed species, which would require Level 2 or 3 Vegetation Management. For construction clearing and during long-term maintenance, woody vegetation over 6 feet in height would be cleared or removed as described above. Vegetation over 6 feet in height includes trees and larger shrub species predominately found in the following

vegetation community types: Aspen Forest and Woodland, Conifer Forest, Deciduous Forest, and Pinyon-Juniper Woodland. Low-growing trees, shrubs, and ground vegetation under 6 feet in height would be left in place and driven over if access is required. Danger trees, defined as trees or tree limbs (located off of the transmission line ROW, and thus outside of normal clearing limits), which are of such height, condition (e.g., leaning, rotted), location (e.g., side hill, proximity to transmission lines, soil characteristics), and/or species type that they represent a threat to the integrity of the transmission line conductors, pole structures, or other Project facilities, would be removed. The desired condition resulting from application of Level 1 vegetation management is low-growth plants composed of grasses and forbs and low-growing shrubs (heights ranging from 2 to 6 feet) (see POD, Appendix R, Figure R2).

Level 2 – Selective ROW Wire-Border Zone Vegetation Management

Level 2 vegetation management would be applied in areas where highly sensitive or constrained resource or agency management issues have been identified. The Wire-Zone/Border-Zone concept would be implemented for Level 2 vegetation management (Bramble and Byrnes 1996). This concept defines two zones within the ROW, the Wire Zone and the Border Zone. The Wire Zone is defined as the section of the ROW that is directly under the wires and extends outward a distance sufficient to accommodate anticipated wire movement (90 feet in width centered on the centerline of the transmission line); the Border Zone starts at the outer edge of the wire zone (i.e., 45 feet from the centerline) and runs to the ROW boundary. Refer to Appendix R of Final EIS Appendix D, POD, Figure R5 for an illustration of the wire zones and border zones associated with different tower types.

Each zone would have different maximum tree heights. Within the Wire Zone, maximum tree heights and vegetation management would be as described for Level 1 above. Within the Border Zone, the only trees to be removed would be trees identified as danger trees, trees over 25 feet tall within the center span (i.e., the center half of the span between two towers), and trees over 35 feet tall in the quarter span (i.e., the first and last quarters of the span nearest to towers) (see POD, Appendix R, Figure R6). Other vegetation management techniques to be used in Level 2 include selective mechanical or manual tree removal, side pruning, and selective use of herbicide. Quaking aspen trees would be cleared during construction. During operations, aspens would be allowed to grow, but would be managed to allowable tree heights and densities. Depending on growth and density characteristics of individual trees, taller vegetation might be allowed in canyons and low-lying valleys.

Level 3 – Selective ROW Clearance Based Vegetation Management

Level 3 would be applied in areas of the ROW where critical resource or agency management issues associated with vegetation within the Wire Zone have been identified. The only trees to be removed would be trees over the minimum clearance heights and fast growing or invasive species. Minimum clearance for the proposed 600-kV DC line is 29 feet (at a maximum elevation of 10,000 feet above mean sea level [amsl]).

Level 3 could be applied in montane forests, pinyon-juniper woodlands, and mountain shrublands where there are sensitive species or other habitat concerns. Level 3 would be the standard vegetation management level applied to riparian and wetlands crossings. Level 3 is expected to be feasible in most of these areas due to increased clearances associated with canyon or low-valley crossings. In some locations, Level 3 also may be achieved by increasing the height of structures to allow a greater diversity and height of vegetation to remain. In Level 3 management areas existing vegetation would be retained in the ROW except where fuel load is too great or where conductor clearances cannot be maintained. Trees would be selectively cleared based on allowed vegetation types, heights, and densities.

Regardless of vegetation management level, in sensitive areas such as riparian zones and forested habitats, the root mat and low growing understory vegetation would be left in place to minimize sediment erosion, and debris that falls in streams would be carefully removed to minimize stream bank damage. Access would be limited to use of existing roads and/or low-impact vehicles for overland travel (i.e., no

new road construction). Helicopters or gin-poles may be used for tower erection. Construction in inventoried roadless areas (IRAs) would occur over a shorter time frame (6 to 9 months).

The depth of wood chips spread over the ROW after vegetation clearing activities could impact vegetation and soil resources in the ROW. Spreading wood chips at a 3-inch depth could increase soil temperature in the winter, moderately increase soil moisture, and substantially decrease soil nitrogen supply and understory vegetation. The increase in soil temperature and soil moisture would have relatively minor ecological effects. However, reductions in the soil nitrogen supply may temporarily reduce productivity of the soil and affect revegetation rates (Binkley et al. 2003). These impacts would increase in magnitude and duration with increasing depth of mulch.

Driving over remaining vegetation not cleared during construction clearing would result in trampling and/or crushing of the vegetation. Leaving the root stock and topsoil in place would allow the vegetation in the ROW to re-sprout from the existing seed bank and root stock. For forest communities, the removal of woody vegetation over 6 feet in height would result in changes in vegetation community structure through increases in the amount of light and open areas in the ROW. Depending on the species present and the length of time required for woody species to re-establish in the ROW, woody communities could temporarily or permanently shift to communities dominated by herbaceous and/or low growing shrubs. In addition, increased light and open areas in the ROW could lead to increased noxious and invasive weed species establishment and spread.

Biological soil crusts damaged during construction activities could affect the health and successful restoration of native vegetative communities. Refer to Section 3.3, Soil Resources, of the Final EIS for further discussion of impacts related to compaction and topsoil. Impacts to wetlands would be avoided to the extent practicable or otherwise mitigated in accordance with the Project's Clean Water Act Section 404 permit.

Potential indirect impacts to vegetation and special status plants from ROW clearing could include increased runoff, erosion, and sedimentation, potential spread and establishment of noxious and invasive species, herbicide drift, changes in the quantity and arrangement of surface fuels, and changes in surface runoff from additional surface disturbance. Application of the design features and mitigation measures listed in **Table 2-7** and described in Chapter 3.0 would result in the avoidance or minimization of most of these potential impacts. The amount of vegetation indirectly affected as a result of Project implementation would vary depending on the type of disturbance. Typically, indirect impacts occur between 100 and 300 feet away from the construction disturbance but could affect vegetation communities farther away should there be increased sedimentation into drainages that could, in turn, affect individual plants and vegetation communities downstream (USFWS 2013).

Construction activities may increase erosion and sedimentation, which can modify the floodplain surface as well as channel beds and banks. These effects may create indirect impacts on nearby riparian vegetation, may directly affect habitat for wildlife and endangered fish, and may adversely impact water quality, which could result in indirect adverse effects to plants, wildlife, and aquatic biota further downstream. Following surface disturbance activities, noxious weeds and invasive species may colonize areas that have minimal vegetation cover. However, it is expected that the Applicant-committed design features/mitigation measures and the additional conservation measures listed in Chapter 2.0 and described in Chapter 3.0 of this BA would minimize the potential for noxious and invasive weed colonization in the action area.

Within the ROW and corridor, temporary and long-term access roads would be required to provide surface access to all structures and work areas. To minimize disturbance, existing access roads would be used wherever practical. Existing roads would be improved as necessary. Non-graded overland access (drive and-crush) would be used where terrain and soil conditions are suitable. Vegetation along existing access roads could be affected (e.g., reduction in growth rate) as a result of dust deposition. No access roads are proposed in IRAs.

Where access to structures or work areas is prohibited by lack of existing roads or where topographic conditions prohibit safe overland access to the site, new access roads would be constructed. To limit surface disturbance from construction of new access roads, the new roads would be located within the ROW where practical, and sited to minimize potential environmental impacts. TransWest has prepared a Framework Access Road Siting and Management Plan (Appendix A of the POD), which would be refined during detailed engineering and design if the Proposed Action is approved. This plan would define site-specific access routes along the ROW. Access roads would be constructed in accordance with AASHTO standards and guidelines and BLM, USFS, and county road requirements on public lands. Water crossings to be implemented for access roads are described in Section 5.7.4 of the POD.

Direct surface disturbance impacts from access road construction would include vegetation trampling/crushing, vegetation removal, grading, and compaction. Indirect impacts from access road construction could include increased erosion, sedimentation, fugitive dust generation, the potential spread and establishment of noxious and invasive weed species, and habitat fragmentation. Outside of the ROW, construction impacts would be limited to the construction of access roads and temporary work areas.

Temporary work areas would be located approximately within 1 mile of the alignment (i.e., in the potential disturbance area described in Chapter 2.0) and would include staging areas, material storage yards, fly yards, pulling, tensioning, and splicing sites, work areas at each structure site, batch plant sites, and guard structures. The portion of surface disturbance associated with each of these areas varies. Staging areas, fly yards, and batch plant sites would be collocated to the extent possible and located in areas that have been previously disturbed or areas of minimal vegetation to minimize surface disturbance. The vegetation in these areas would be cleared only to the extent necessary. Staging areas and fly yards might be bladed and graveled. Equipment staging and refueling sites would be collocated with other temporary work areas. Wire pulling, tensioning, and splicing sites, as well as a structure work areas, would be completely cleared of vegetation during construction. The Applicant would locate wire pulling, tensioning, and splicing sites such that clearing and blading activities would be minimized to the extent practical. The work area around each structure location would be 250 feet x 200 feet (1.15 acres) located within the ROW. Areas around each structure that would be completely cleared of vegetation would vary by tower type. The use of guyed steel lattice structures would require clearing approximately 0.9 acre of vegetation around the tower base vs. 0.4 acre of clearing for self-supporting steel lattice structures, and 0.3 acre of clearing for self-supporting tubular steel towers (POD Appendix R, Figures R3 and R4).

Landscape fragmentation would result from the development of the access road network, facilities, and transmission line towers. Landscape fragmentation is defined as the transformation or break-up of large patches of continuous, connected areas into a number of patches of smaller total area which are isolated from each other. Landscape fragmentation, through the construction of access roads, utility corridors, and facilities, breaks up native habitats into smaller units separated by areas of disturbance or different habitat types. Landscape fragmentation can result in loss of habitat area, increased edge effects, effects on sensitive plant populations, and increased competition from noxious and invasive weed species.

Linear surface disturbances such as those associated with transmission lines and roads have been shown to provide pathways for further spread of noxious and invasive species into adjacent undisturbed areas (Gelbard and Belnap 2003; Watkins et al. 2003) and serve as a vector for weed propagules (D'Antonio et al. 2001). Localized surface disturbances can facilitate the invasion of noxious and invasive species by removing native vegetative cover, creating areas of bare ground (Burke and Grime 1996; Watkins et al. 2003), and increasing light and nutrient availability (Stohlgren et al. 2003, 1999). Noxious and invasive weed species compete with native plants, can degrade and modify native communities, and can reduce resources for native plant species (e.g., moisture, soil nutrients, and light).

5.1.2.2 Ancillary Facilities

Communication System

The proposed fiber optic regeneration/repeater stations would have a total maximum disturbance footprint of 4.6 acres (comprised of up to 20, 10,000-square-foot sites) primarily located within the proposed ROW and spread along the length of the Project. There is a high degree of flexibility in the exact locations of these facilities and they could be easily located outside of known or potentially suitable habitat for federally listed plant species.

Similarly, any new microwave antenna towers needed for the secondary communications path would be few in number and could be sited to avoid impacts to federally listed plant species following completion of pre-final design and/or pre-construction plant surveys. Consequently, no impacts to special status plant species are anticipated as a result of Project communication system construction and operation.

Ground Electrode System

The amounts of ground disturbance associated with the ground electrode system sites, Bolten Ranch in Region I and Halfway Wash East in Region III, are detailed in **Table 2-5**. For the Bolten Ranch site, approximately 93 percent of the construction and operation disturbance would be to the sagebrush and saltbush shrubland vegetation types. There are no federally listed plant species associated with these two vegetation communities in this area. It should be noted that Little Sage Creek bisects the Bolten Ranch Siting Area. Riparian wetlands associated with Little Sage Creek have potential to support Ute ladies'-tresses but there are no known occurrences in this area and impacts to this habitat would be avoided during construction and operation of this facility.

The Halfway Wash East ground electrode system siting area is located in desert shrub habitat and there are no occurrences of federally listed plant species associated within this the siting area. Thus, no impacts to these species are anticipated to result from the ground electrode system facilities.

Terminals

Northern Terminal

Construction of the Northern Terminal, including the converter station and substation footprints, access roads, a concrete batch plant site, temporary work areas, and pulling, tensioning, and splicing sites for the interconnections, would result in direct disturbance to 519 acres of vegetation. The majority of the disturbance associated with the Northern Terminal would occur in the saltbush and sagebrush shrubland vegetation communities. There is a small area of herbaceous wetland in the northwestern portion of the Northern Terminal Siting Area, which provides potentially suitable habitat for federally listed Ute ladies'-tresses orchid. The proposed terminal site is located over a mile from this area and impacts to these wetlands and, in turn, Ute ladies'-tresses, due to terminal construction are unlikely. NWReGAP land cover data indicates that 28 acres of woody riparian and wetland vegetation would be impacted by construction of the Northern Terminal. These areas do not have perennial streamflows and are dominated by salt-tolerant shrubs such as greasewood and tamarisk. Consequently, they are unlikely to support any special-status plant species.

Vegetation would be cleared within the entire Northern Terminal location plus an additional buffer of 8 to 10 feet outside the fence (249 acres). After vegetation clearing, the area would be graded to a level surface as needed and the drainage design would be implemented. A soil sterilizer would be applied to prevent regrowth of vegetation and a 4- to 6-inch layer of crushed rock would be laid down resulting in a loss of vegetation for the footprint of the terminal site. Following completion of Northern Terminal construction, 270 acres of disturbed land would be immediately reclaimed pursuant to TransWest's Final POD. Reclamation would consist of re grading, mitigating soil compaction, seeding and replanting in accordance with land management agency or private landowner requirements.

Potential indirect effects associated with construction of the Northern Terminal could include the establishment and spread of noxious and invasive weed species, changes in surface fuels due to establishment and growth of annual species, and fugitive dust generation. Following surface disturbance activities, noxious weeds and invasive species could colonize areas that have minimal vegetation cover. Populations of weedy annual species (e.g., halogeton, cheatgrass) could become established in localized areas. These effects would be avoided or minimized by implementation of the design features and conservation measures listed below.

Pre-construction surveys would determine whether and where wetlands and other WUS occur within the Northern Terminal Site. Any wetland habitats capable of supporting Ute ladies'-tresses that would be impacted by construction would be surveyed for this species. TransWest has developed a Framework Water Resources Protection Plan (Appendix W of the POD), which, in conjunction with the terms and conditions of the Project's CWA Section 404 Permit, would ensure that impacts to wetlands and other WUS are avoided or minimized to the maximum extent practicable. If jurisdictional wetlands are impacted by the Northern Terminal, compensatory mitigation measures would be developed through the CWA 404 permitting process. Any wetlands containing Ute ladies'-tresses would be avoided.

While BMPs, design features, and conservation measures would increase reclamation success, the loss of woody vegetation in temporary use areas would represent a long-term impact, as it would take up to 10 to 25 years following reclamation for mature shrub species to re-establish. Through the implementation of mitigation measures, direct impacts to wetlands and riparian areas would be avoided and the spread of noxious weeds would be minimized.

Southern Terminal

Construction of the Southern Terminal would result in direct disturbance to 557 acres of vegetation. Table 3.5-7 of the Final EIS identifies estimated acreages of Project-related surface disturbance by vegetation cover type within the Northern and Southern Terminal locations. The Southern Terminal is located in only two vegetation community types (desert shrub and developed/disturbed). The majority of the disturbance in the Southern Terminal would occur in the developed/disturbed community type.

Surface disturbance activities and site clearing operations associated with the Southern Terminal would be identical to those associated with the Northern Terminal. Since the predominant cover type within the Southern Terminal Siting Area is developed/disturbed and there are no known special status plant species in the area, no direct impacts to federally listed species are anticipated. As with the Northern Terminal, indirect effects associated with construction of the Southern Terminal include the establishment and spread of noxious and invasive weed species and fugitive dust generation.

Southern Terminal Alternate

Construction of the Southern Terminal Alternate location would result in direct disturbance effects to 755 acres of vegetation. The Southern Terminal Alternate is located in the same siting area as the Southern Terminal. Within the site for the Southern Terminal Alternate are two vegetation community types (desert shrub and developed/disturbed). The majority of the disturbance in the Southern Terminal Alternate site would occur in the developed/disturbed community type.

Surface disturbance activities, site clearing operation, and decommissioning impacts associated with the Southern Terminal Alternate would be identical to those described for the Northern Terminal. Indirect impacts to vegetation, wetlands, and noxious weeds would be similar to those discussed for the Southern Terminal.

5.1.2.3 Impact Avoidance and Minimization during Project Construction

Implementation of the applicant-committed design features and mitigation measures and additional conservation measures listed in **Table 2-7** and described in Chapter 3.0 would avoid and minimize impacts to federally listed plant species resulting from construction activities. Relevant general measures

include but are not limited to: TWE-1, TWE-2, TWE-4, TWE-5, TWE-6, TWE-7, TWE-8, TWE-9, TWE-10, TWE-11, TWE-12, TWE-13, TWE-14, TWE-15, TWE-19, TWE-20, TWE-21, TWE-22, TWE-23, TWE-24, TWE-26, TWE-27, TWE-28, TWE-29, TWE-31, TWE-33, TWE-34, TWE-47, TWE-58, TWE-61, TWE-64, SSWS-14, SSWS-15, SSWS-16, SSWS-22, WR-3, NX-1, NX-2, NX-3, NX-4, VG-1, VG-2, VG-3, VG-4, VG-5, WET-1, WET-2, WET-3, SS-3, SS-4, SS-5, SS-6, and SS-9. Applicable species-specific conservation measures are described in the individual species sections below.

5.1.3 Operation and Maintenance Activities

5.1.3.1 Transmission Line

Following reclamation and revegetation of temporary use sites disturbed during Project construction, there would be long-term impacts to vegetation resulting from operation and maintenance activities along the transmission line ROW. These impacts would include the permanent loss of vegetation due to facility, structure, and access road footprints, maintenance activities in the ROW, and increased use of access roads. To the extent that federally listed plant species occur in or immediately adjacent to the ROW, there could be long-term impacts to these species in the absence of BMPs or other mitigation measures. Acres of operation-related surface impacts are listed in **Table 2-4**

Vegetation maintenance for the ROW would be defined by the Vegetation Management Plan as described under the Construction Activities section above. Any ROW maintenance activities that occur in wetlands or adjacent riparian areas and could result in deposition of dredged or fill materials or contaminants in wetlands and other WUS would require USEPA, State Department of Environmental Quality (DEQ), or USACE approval.

Noxious weed and invasive species impacts could result from maintenance activities and increased use of access roads. Maintenance activities can aid in the mechanical transport of propagules from outside the ROW. Removal of taller vegetation can create open patches of vegetation and bare ground and facilitate the invasion of noxious and invasive species with increased light and nutrient availability (Burke and Grime 1996; Stohlgren et al. 2003, 1999; Watkins et al. 2003). Applicant-committed design features and mitigation measures and additional conservation measures related to noxious weed control during operation and maintenance of the Proposed Action are the same as those identified for construction activities.

For all areas disturbed and reclaimed, a general mitigation monitoring plan would be developed as part of the COM Plan that would address how each mitigation measure would be monitored for compliance, as described in the Appendix R of the POD. Reclamation of the vegetation communities back to their native diversity and composition would vary across the Project due to various factors such as soil mixing, timing and duration of disturbance, topography, slope, soil moisture, and precipitation. Reclamation standards for the Project would vary by the requirements defined by each land management agency crossed by the Project. In general, reclamation success is defined as re-establishing a self-sustaining, diverse vegetation community composed of species native to the region in sufficient species density and diversity to closely approximate natural, undisturbed vegetation potential. In herbaceous communities, reclamation is often determined by the establishment of adequate ground cover to prevent erosion and provide forage for wildlife species and grazing operations.

It is estimated that, overall, herb-dominated plant communities would require a minimum of 2 to 5 years to establish adequate ground cover to prevent erosion and provide forage for wildlife species and grazing operations. Woody-dominated plant communities would require at least 10 to 25 years for shrubs to recolonize the area while re-establishment of mature woodlands would require at least 30 to 50 or more years. Depending on the composition and topography of existing woodlands, recovery could take up to 80 to 100 years to achieve mature trees of similar stature to pre-construction conditions. In areas with soil reclamation constraints, low regional annual precipitation rates, and the invasion and spread of noxious and invasive weed species, successful reestablishment of native vegetation may require additional measures, and take a longer timeframe. The success of woodland re-establishment could be

impacted by collocated disturbances and adverse environmental conditions including wildfire, drought, climate change, insects, and disease (Folke et al. 2004; Loehman et al. 2011).

In areas with soil reclamation constraints, low regional annual precipitation rates, and the invasion and spread of noxious and invasive weed species, community recovery is anticipated to be long-term, and may not be successful (10 to 100 years depending on the community structure). Some plant communities may not return to pre-construction conditions due to alteration of soil communities, noxious weed invasion, and loss of biological soil crusts. The implementation of additional reclamation techniques such as minimization of surface disturbance, soil amendments, and noxious weed control may be required in these areas to achieve successful reclamation. Areas with soil reclamation constraints are identified in Section 3.3, Soil Resources.

5.1.3.2 Ancillary Facilities

Communication System

Operation and maintenance of the communication system is not anticipated to have any additional effects to federally listed plant species beyond those described for operation and maintenance of the transmission line.

Ground Electrode Facilities

Over 90 percent of the area affected by ground electrode system sites and their associated power lines would be reclaimed and revegetated following construction. The remaining long-term operation and maintenance impacts associated with these facilities would be associated with the 6-acre footprint of the control buildings at each site and access roads to each site. For the Bolten Ranch site in Region I, there would be a total of 52 acres of long-term surface disturbance and for the Halfway Wash East site in Region III, there would be a total of 15 acres of long-term disturbance. The difference in impacts between these two sites is due to the length of the access roads. Refer to **Table 2-6** for a summary of impact acreages for these facilities. Neither of these facilities are expected to affected federally listed or candidate plant species as a result of long-term operation and maintenance activities.

Terminals

Northern Terminal

After completion of interim reclamation of temporary use areas, remaining surface disturbance would be approximately 249 acres and consist of the footprints of the access roads, station facilities, and the perimeter fence. Potential long-term impacts to vegetation resulting from the establishment and spread of noxious and invasive weed species would be avoided or minimized through implementation of the Applicant-committed design features, mitigation measures, and additional conservation measures listed below. Long-term operation of the Northern Terminal is expected to have no effect on federally listed plant species.

Southern Terminal and Southern Terminal Alternate

Following reclamation of temporary use areas, long-term operation of the Southern Terminal would occupy 226 acres of land. Long-term operation-related effects are expected to be similar to those described above for the Northern Terminal.

5.1.3.3 Impact Avoidance and Minimization during Project Operation & Maintenance

Implementation of the applicant-committed design features and mitigation measures and additional conservation measures listed in **Table 2-7** and described in Chapter 3.0 would avoid and minimize impacts to federally listed plant species resulting from Project operation and maintenance activities. Relevant general measures include but are not limited to: TWE-1, TWE-2, TWE-3, TWE-5, TWE-6, TWE-12, TWE-24, TWE-26, TWE-31, TWE-58, TWE-61, TWE-62, TWE-64, SSWS-14, NX-1, NX-2,

NX-3, NX-4, VG-2, VG-3, SS-5, SS-6, and SS-9. Applicable species-specific conservation measures are described in the individual species sections below.

5.1.4 Decommissioning Activities

Decommissioning activities would include the removal of the transmission line, towers, access roads (in accordance with landowner or land management agency desires), communication facilities, and ground electrode systems and the reclamation and revegetation of the footprints of these facilities. Potential decommissioning and reclamation-related impacts to vegetation and federally listed plant species occurring in or immediately adjacent to the ROW would be similar to those discussed for construction activities. The magnitude of these impacts would, however, be considerably less than during construction because relatively little vegetation would need to be removed during decommissioning. The reclamation activities described above for interim reclamation of construction-related temporary use sites would be applied to the project footprint as a whole during the decommissioning phase of the Project. Many of the same BMPs, design features, and conservation measures applicable to construction would be applied during this phase to reduce impacts to special status plants during decommissioning activities.

5.2 Wildlife

5.2.1 Pre-construction Activities

5.2.1.1 Environmental Surveys

Environmental surveys including sensitive plant and animal surveys, cultural and paleontological investigations would use existing access roads to the extent possible. Where surveys areas cannot be accessed by the existing road network, all field work would be conducted on foot. Potential impacts to federally listed, EXP/NE, and candidate wildlife species resulting from these surveys would likely be limited to avoidance of human activity and temporary displacement from survey areas. To the extent that ground-nesting birds occur within the survey area and surveys are conducted during the avian breeding season, it is possible that environmental surveys could result in the loss or abandonment of nests. Implementation of the Applicant-committed design features and mitigation measures and additional conservation measures listed below would avoid or minimize these impacts, likely rendering them negligible or discountable across the project as a whole.

5.2.1.2 Engineering Surveys

Potential impacts to special status wildlife species resulting from engineering surveys would be similar to but potentially more intensive and extensive than those described above for environmental surveys. While engineering surveys would use existing roads to the extent possible, there would likely be some level of off-road motorized travel. Depending on terrain and vegetation, off-road travel would be conducted on foot or using low-impact rubber-tired ATVs in accordance with the appropriate land management agency or landowner requirements. To the extent that surveys are conducted using ATVs, they would have a greater potential for impacting small mammals and ground-nesting birds and have a greater radius of disturbance associated with noise and human activity relative to the environmental surveys.

5.2.1.3 Geotechnical Investigations

Impacts to federally listed, EXP/NE, and candidate wildlife species resulting from geotechnical investigations would be similar to but greater than those described above for environmental and engineering surveys. A drill rig, water truck, and 4-wheel drive support vehicles would be used to access sampling sites where soil borings 6 to 8 inches in diameter and up to 70 feet deep would be taken. Geotechnical sampling would be performed using rubber-tired, rubber-tracked, or low-impact drill rigs and approved access routes and methods in accordance with appropriate land management agency or landowner requirements. Relative to other pre-construction surveys, the greater number and size of

vehicles and equipment needed to complete geotechnical investigations would result in greater potential impacts to wildlife. Each sampling site would require a work area typically 40 x 40 feet in size (0.37 acre) and a disturbance area approximately 5 feet in diameter. Surface disturbance at boring sites would result in an incremental loss of wildlife habitat and would likely be so small relative to the extent of surrounding habitats as to have negligible direct effects on special status wildlife species. Due to the greater number of vehicles, equipment, and personnel, geotechnical investigations would have a larger radius of indirect disturbance to wildlife associated with noise and human activity than other pre-construction survey efforts. These effects would be short in duration, lasting approximately 0.5 day per sampling site.

5.2.1.4 Impact Avoidance and Minimization during Project Pre-construction Activities

Implementation of the applicant-committed design features and mitigation measures and additional conservation measures listed in **Table 2-7** and described in Chapter 3.0 would avoid and minimize impacts to federally listed, EXP/NE, and candidate wildlife species resulting from pre-construction environmental and engineering surveys and geotechnical investigations. Relevant general measures include but are not limited to: TWE-1, TWE-2, TWE-4, TWE-5, TWE-26, TWE-31, TWE-32, TWE-61, TWE-62, TWE-64, SSWS-15, SSWS-22, WLF-1, WLF-2, and NX-1. Applicable species-specific conservation measures are described in the individual species sections below.

5.2.2 Construction Activities

5.2.2.1 Transmission Line

Potential transmission line construction-related impacts to federally listed, EXP/NE, and candidate wildlife species include habitat loss, fragmentation, and wildlife mortalities as a result of vehicle collisions and crushing of nests and burrows. Construction impacts account for all disturbance during construction of the Project (e.g., clearing of vegetation for footing construction, upgrading access roads, etc.) and are typically short-term. Construction activities would likely result in wildlife avoidance of otherwise suitable habitat in and around the Project disturbance areas during the construction period. Whereas forest-interior species could be displaced from the action area for the life of the project, displacement impacts to species associated with more open shrubland and grassland habitats would likely be short term with species returning to habitats remaining along the ROW following completion of construction activities.

Construction of the proposed Project would result in the alteration, degradation, and loss of wildlife habitat, of which a percentage would be immediately reclaimed following construction of the facilities. The remaining disturbance area would be reclaimed at the end of the life of the Project (estimated at 50 years). General recovery times of the various vegetation communities that provide habitat for wildlife species within the action area are discussed in Section 5.1.3.1, above.

Habitat loss or alteration from surface disturbance could result in direct losses of smaller, less mobile species of wildlife, such as small mammals and reptiles, and the displacement of more mobile species into adjacent habitats. Surface disturbance also would result in an increase in habitat fragmentation along the proposed Project until reclamation has been completed and vegetation is re-established.

The road network, which would be constructed or upgraded to fulfill the construction requirements of the proposed Project, may impact wildlife species to varying degrees depending on the geographic location, type of habitat disturbed, and wildlife species potentially impacted. There are seven types of potential impacts to wildlife habitat associated with roads including: 1) increased mortality from road construction; 2) increased mortality from collisions with vehicles; 3) modification of wildlife behavior; 4) alteration of the physical environment; 5) alteration of the chemical environment; 6) spread of invasive and exotic species; and 7) increased alteration and use of habitats by humans (Trombulak and Frissell 2000). Not all species and ecosystems are equally impacted by roads, but overall, the presence of roads is highly correlated with changes in species composition, population sizes, and hydrologic and geomorphic processes that shape aquatic and riparian habitats (Trombulak and Frissell 2000).

Though not federally listed, big game species provide an important source of prey for the endangered gray wolf and a source of carrion for the California condor. Potential direct impacts to big game species (e.g., pronghorn, mule deer, elk, moose) would include the incremental loss of potential forage and the increase of habitat fragmentation from vegetation removal associated with surface disturbance. The primary potential indirect impact would be wildlife avoidance (displacement) of otherwise suitable habitat in the vicinity of Project disturbance areas due to noise and human activity. Impacts due to disturbance also may include both short- term changes to big game migration corridors during periods of construction activity. Such impacts likely would be more pronounced in big game crucial winter range, fawning/calving areas, and elk foraging areas depending on the timing of construction in these areas. Impacts to crucial winter range would include the loss of potential cover and forage consisting primarily of woody/shrubby vegetation such as sagebrush, bitterbrush, and winterfat. Loss of available forage (e.g., woody shrubs, such as sagebrush) could result in a long-term (greater than 25 years) impact to wintering big game species.

Construction of the proposed Project could result in direct impacts, including the loss of habitat, to small game species (e.g., upland game birds and small game mammals) including greater sage-grouse and prey species for the threatened Canada lynx. Impacts from Project construction also would include animal displacement from the disturbance areas and increased habitat fragmentation. Potential construction-related impacts also could include nest and burrow abandonment or loss of eggs or young. These losses could reduce productivity for that breeding season, depending on timing and duration of construction activities in a specific area. Indirect impacts associated with human activity and noise have been shown to negatively impact small game populations, especially upland game birds. These species may experience increased mortality rates due to increased access as a result of new and improved roads (Holbrook and Vaughan 1985). Vehicular traffic may injure or kill individuals and local populations may experience higher levels of hunting and poaching pressure, due to improved human access (Holbrook and Vaughan 1985). In most instances, suitable habitat adjacent to disturbance areas would continue to be available for use by small game species. However, to the extent that small game are adversely impacted by construction, there would be an incremental loss in prey for federally listed forest carnivores.

Indirect impacts from the construction of the proposed Project would result from increased human activity and noise in the vicinity of the terminal locations and the approved ROW. The most common wildlife responses to noise and human activity are avoidance or accommodation. Avoidance would result in displacement of animals from an area larger than the actual disturbance area. Following avoidance of human activity and noise-producing areas during construction, certain wildlife species may acclimate to the activity and begin to return to areas that were formerly avoided. For example, during construction, it is likely that big game species (i.e., pronghorn, mule deer) would be displaced from a larger area than the actual disturbance sites due to the avoidance response. Displacement of big game species as a result of direct habitat loss and indirect reduction in habitat quality has been widely documented (Irwin and Peek 1983; Lyon 1983, 1979; Rost and Bailey 1979). Studies have shown that big game species tend to move away from areas of human activity and roads, thereby reducing habitat utilization near disturbance areas (Cole et al. 1997; Sawyer et al. 2006). However, big game species have demonstrated the ability to acclimate to a variety of activities as long as human harassment levels do not increase substantially (Forman et al. 2003). Therefore, it is possible that the extent of displacement would approximate the actual disturbance area after the first few years of operation (Forman et al. 2003). Mule deer and pronghorn appear to be more tolerant of human activity than desert bighorn sheep. For mule deer, displacement distances from new roads ranged from 330 feet to 0.6 mile, depending on the presence of vegetative cover (Rost and Bailey 1979). However, disturbance associated with construction activities would occur over a relatively short period and it is assumed that big game species would return to the area following completion of Project construction. In addition to an avoidance response, increased human activity intensifies the potential for wildlife/human interactions ranging from harassment of big game species to legal harvest or poaching.

Noise levels associated with construction may impact migratory bird species that occupy habitats in the migratory bird analysis area. Studies also have shown that reductions in bird population densities in both open grasslands and woodlands also may be attributed to a reduction in habitat quality produced by elevated noise levels (Reijnen et al. 1997, 1995). Although visual stimuli in open landscapes may contribute to reduced bird densities at relatively short distances, the impacts of noise appear to be the most critical factor since breeding birds of open grasslands (threshold noise range of 43 to 60 decibels on the A weighted scale [dBA]) and woodlands (threshold noise range of 36 to 58 dBA) respond very similarly to disturbance by traffic volume (Reijnen et al. 1997). Reijnen et al. (1996) determined a threshold of effect for bird species to be 47 dBA, while a New Mexico study in a pinyon-juniper community found that impacts of gas well compressor noise on bird populations were strongest in areas where noise levels were greater than 50 dBA. However, moderate noise levels (40 to 50 dBA) also showed some effect on bird densities in this study (LaGory et al. 2001).

5.2.2.2 Ancillary Facilities

Communication System

The proposed fiber optic regeneration/repeater stations would have a total maximum disturbance footprint of 4.6 acres primarily located within the proposed ROW and spread along the length of the Project. Due to the small size of these facilities and their location within the ROW, their additional incremental impact to federally listed, EXP/NE, and candidate wildlife species is expected to be negligible.

Similarly, any new microwave antenna towers needed for the secondary communications path would be few in number and could be sited to avoid or minimize impacts to habitat for special status wildlife species. Consequently, no substantive impacts to these species are anticipated as a result of Project communication system construction.

Ground Electrode Facilities

The amounts of surface disturbance associated with the ground electrode system sites, Bolten Ranch in Region I and Halfway Wash East in Region III, are detailed in **Table 2-5**. For the Bolten Ranch site, approximately 93 percent of the construction disturbance would be to the sagebrush and saltbush shrubland vegetation types. Construction of this site would impact greater sage-grouse nesting and brood-rearing habitat (there are 10 occupied leks within 4 miles of the Bolten Ranch Siting Area and associated power line). There is a small amount of riparian vegetation (<1 acre) in the Bolten Ranch siting area that could provide habitat for yellow-billed cuckoo but it is not expected to be directly affected by construction of this facility.

The Halfway Wash East ground electrode system siting area is located in desert shrub habitat and provides suitable habitat for desert tortoise. Construction of this facility would have potential to adversely affect tortoise but implementation of conservation measure SSWS-4 would avoid or minimize these impacts.

Terminals

Northern Terminal

The existing conditions at the proposed Northern Terminal siting area relative to wildlife habitat can be characterized as highly disturbed and fragmented. Located close to the urbanized areas of Sinclair and Rawlins, Wyoming, the siting area exhibits multiple types of anthropogenic disturbance. The major source of disturbance is the Interstate 80 (I-80) and State Highway (SH)-76 corridor located approximately 2.2 miles to the north. This highly active corridor provides constant disturbance from vehicle traffic and fragments the landscape for several miles in both directions. In addition, the Northern Terminal sitting area is fragmented by several existing pipeline ROWs, a transmission line, SH-71 to the west and a Union Pacific Railroad rail line to the north. Other notable sources of disturbance near the

Northern Terminal siting area include the Sinclair petroleum refinery located approximately 3 miles to the northeast and the Wyoming State Penitentiary located approximately 3.4 miles to the west.

Construction of the Northern Terminal would result in the disturbance of 491 acres of potential wildlife habitat. Of this, approximately 255 acres of temporary use areas would be reclaimed immediately following construction. Impacts to wildlife resulting from this surface disturbance would include the loss and additional fragmentation of wildlife habitat. Habitat loss or alteration could result in direct losses of smaller, less mobile wildlife species, such as small mammals and reptiles, and the displacement of more mobile species into adjacent habitats. The only federally listed or candidate species with potential to be affected by construction of the Northern Terminal is greater sage-grouse. There are four occupied leks within 4 miles of the siting area and, whereas the proposed terminal site is located primarily in saltbush shrubland habitat, there is potential sage-grouse nesting and brood-rearing habitat in sagebrush and riparian wetland habitats adjacent to the site.

Applicant-committed design features and mitigation measures, and additional conservation measures applicable to the terminal sites are identified in **Table 2-7** and described in Chapter 3.0. After considering the level of existing disturbance and the application of design features and conservation measures, remaining terminal construction impacts to greater sage-grouse would be limited to habitat loss and fragmentation and potential disturbance during construction and interim reclamation of temporary use sites.

Southern Terminal and Southern Terminal Alternate Siting Area

The existing conditions at the proposed Southern Terminal Siting area relative to wildlife habitat can be characterized as moderately disturbed and fragmented. The majority of human disturbance near the siting area results from US-95 located approximately 3.5 miles to the east. This highway is a major source of fragmentation in the local area. Multiple high-voltage transmission lines are located on both sides of the two sites. An existing electrical substation is located approximately 0.5 mile to the southwest of the siting area and the Solar One energy plant is located approximately 1.5 miles to the southeast of the siting area. These facilities contribute to the level existing disturbance and habitat fragmentation adjacent to the siting area.

Construction of the Southern Terminal and the Southern Terminal Alternate would affect primarily desert shrubland vegetation, which provides potentially suitable habitat for the federally listed threatened Mojave desert tortoise. Based on SWReGAP land cover data, construction of the Southern Terminal would result in impacts to 63 acres of desert shrubland habitat during construction. Approximately 38 acres of temporary use areas would be reclaimed following construction. Similarly, construction of the Southern Terminal Alternate would result in impacts to 85 acres of desert shrubland habitat during construction. Of this, approximately 56 acres of temporary use areas would be reclaimed immediately following construction. Implementation of Applicant-committed design features and mitigation measures and additional conservation measure SSWS-4 (described in Section 5.4.3.1 Desert Tortoise, below), would avoid or minimize potential impacts to desert tortoise resulting from construction of the Southern Terminal or Southern Terminal Alternate.

5.2.2.3 Impact Avoidance and Minimization during Project Construction

Implementation of the applicant-committed design features and mitigation measures and additional conservation measures listed in **Table 2-7** and described in Chapter 3.0 would avoid and minimize impacts to federally listed, EXP/NE, and candidate wildlife species resulting from Project construction. Relevant general measures include but are not limited to: TWE-1, TWE-2, TWE-3, TWE-4, TWE-5, TWE-6, TWE-7, TWE-8, TWE-9, TWE-10, TWE-12, TWE-13, TWE-15, TWE-16, TWE-20, TWE-22, TWE-23, TWE-24, TWE-26, TWE-27, TWE-28, TWE-29, TWE-30, TWE-31, TWE-32, TWE-33, TWE-34, TWE-45, TWE-53, TWE-58, TWE-59, TWE-60, TWE-61, TWE-62, TWE-64, SSWS-14, SSWS-15, SSWS-16, SSWS-22, WLF-1, WLF-2, WLF-6, NX-1, NX-2, NX-3, VG-1, VG-2, VG-3, WET-1, WET-2,

and WET-3. Applicable species-specific conservation measures are described in the individual species sections below.

5.2.3 Operations & Maintenance Activities

5.2.3.1 Transmission Line

Following construction, temporary use sites would be reclaimed and revegetated. Timeframes for successful reclamation can vary depending on multiple factors including soil types and conditions, climate (e.g., drought persistence), noxious weed invasions, and effective monitoring and adaptive management in problem areas. Impacts to federally listed, EXP/NE, and candidate wildlife species during the operation phase of the project would be less intensive as well as less extensive that the construction impacts but be of much longer duration. These impacts would last at least as long as the Project is in operation and maintenance activities are conducted, estimated at 50 years. Examples of potential operation impacts include long-term habitat loss and degradation in and around the footprints of Project facilities, wildlife mortalities that occur as a direct and indirect result of the facilities themselves, possible injuries and mortalities associated with maintenance activities, increased predation of local prey populations by perching raptors and corvids, and habitat degradation resulting from increased noise and human activity in and along the ROW and access roads.

Potential impacts associated with operation of the power lines and associated facilities include avian mortalities as a consequence of electrocution or collision with Project components. Electrocution is primarily associated with smaller (i.e., 60 kV or less) transmission and distribution lines, due to the smaller size of towers and closer spacing of the conductors (APLIC 2006). Because of their smaller towers and close spacing of conductors, the overhead electrical lines associated with the ground electrode systems are the Project components with the highest avian electrocution potential. However, these lines typically would be energized for less than 30 hours per year. Thus, the likelihood that they would result in electrocutions is very low.

Collision potential typically is dependent on variables such as the location in relation to high use habitat areas (e.g., nesting, foraging, and roosting); line orientation to flight patterns and movement corridors; species composition; visibility; and line design (APLIC 2006). However, avian mortality from collisions with power lines is well documented (Brown and Drewien 1995). Although rarely impacting healthy populations with good reproductive potential, collision mortality can be biologically significant to small local populations and endangered species (APLIC 2012; Faanes 1987). Avian loss is often greatest where power lines cross migratory paths, bisect feeding and nesting-roosting sites, or occur adjacent to major avian use areas (Savereno et al. 1996). Higher risk also exists when land topography funnels birds through power-line corridors (Bevanger 1990; Faanes 1987). While some species of birds (e.g., upland game birds and certain grassland migratory birds) are predominantly ground dwelling species, the risk for collision during flight is heavily dependent upon transmission line locations, such as locations between loafing and feeding areas or migration routes. Highest collision probabilities appear to occur where birds typically fly between foraging and loafing habitats bisected with overhead lines (Science Applications International Corporation [SAIC] 2001).

Factors that influence the risk of collision to individual birds as they encounter power lines are varied and include flight characteristics, previous experience with power lines (typically a function of age), weather, and power line structural characteristics (APLIC 2006, 1994). The static wire, also referred to as the shield or groundwire, has been shown to pose the greatest collision danger to birds (APLIC 2012; Faanes 1987). Research has indicated that most collisions occur with static wires when birds increased their altitude in apparent attempts to avoid conductor wires. Birds maneuvering to avoid the conductor wires actually increased collision risk and in the absence of static wires most collisions could have been avoided. If power lines must be placed above ground, the risk of collision would probably be reduced if all wires were in a single horizontal plane (Bevanger 1994).

Research on communication and meteorological towers suggests that the use of guy wires increases avian collision risk and mortality (Erickson et al. 2005; Gehring et al. 2009; Manville 2009, 2005). Although these types of towers tend to be considerably taller and have more complex guy wire configurations than the transmission line tower designs being considered for this project, the use of guyed transmission towers could increase avian collision risk relative to unguyed towers. This risk is expected to be higher for species with high wing loading and rapid flight such as greater sage-grouse and waterfowl. Where guy wires must be used, they should be adequately marked with bird diverters to reduce avian collision risk (Manville 2005).

Research conducted by Savereno et al. (1996) indicates that the height of the transmission lines relative to a bird's flight heights could be a potential risk factor. Empirical data and theoretical considerations indicate that species with high wing loading and low aspect run a high risk of colliding with power lines. These birds are characterized by rapid flight and the combination of heavy body and small wings restricts swift reactions to unexpected obstacles (Bevanger 1998). Raptors have a much greater wing to body ratio, and are more likely to fly at levels well above the transmission line heights, and maintain flight levels for an extended period of time. Other bird species, such as greater sage-grouse, may have a greater potential for collision risk because of the smaller wing to body ratio, resulting in lower flight heights and a greater occurrence of takeoffs and landings crossing the transmission line levels.

Operation-related impacts to big game and small game species would result primarily from vegetation management and other maintenance activities, including semi-annual aerial and annual ground-based transmission line inspections. Depending on species sensitivity, some species may experience disruption or additional stress due to helicoper flights and the presence of 4x4 trucks, 4x4 ATVs, and/or ground crews. Vegetation maintenance would have impacts similar to those described above for construction activities. Noise and human activity impacts also are discussed above.

Avian predators, particularly raptors, are attracted to overhead utility lines because they provide perches for various activities, including hunting (APLIC 2006). Power poles increase a raptor's range of vision, allow for greater speed during attacks on prey, and serve as territorial markers (APLIC 2006; Manville 2002; Steenhof et al. 1993). Small game species would have potential increased risk of predation by raptor and corvid species, which may perch on transmission lines and towers. Increased predation rates of small game would result in an incremental reduction in prey availability for Canada lynx.

Transmission line structures can impact small game, nongame, migratory bird, reptile, and amphibian populations by enhancing raptor and corvid populations. Raptors and corvids nest and perch on transmission structures which create vertical structure in generally treeless shrub-steppe habitats (Knight and Kawashima 1993; Steenhof et al. 1993). Raptors and corvids may then occur at higher densities than normal due to increased nesting locations and perches. For example, within one year of construction of a 372.5-mile-long transmission line in southern Idaho and Oregon, raptors and common ravens began nesting on the transmission towers. Within 10 years of construction, 133 pairs of raptors and ravens were nesting along this stretch (Steenhof et al. 1993). Along a transmission line in Nevada, the mean number of the most common raptor species observed over a 6-year period, 1 year prior to and 5 years after construction of the line, remained relatively stable. However, the mean number of common ravens seen per survey point dramatically increased during the first 4 years after construction before declining drastically the fifth year after construction (Nonne et al. 2011).

5.2.3.2 Ancillary Facilities

Communication System

Operations and maintenance of the communication system would not involve any additional ground disturbance beyond the 4.6-acre footprint of the facilities. Incremental impacts to wildlife associated with human activity and noise would be associated with facility inspections and maintenance. Regeneration stations would be inspected every 2 to 3 months by a 2-person crew in a light truck. Annual maintenance would be conducted by a 2-person crew over a 2- to 5-day period. With implementation of the Applicant's

design features and mitigation measures, BMPs, and the general and species-specific conservation measures listed below, impacts to wildlife from these activities is expected to be minimal and unlikely to have any additional effect on federally listed, EXP/NE, and candidate species beyond those described above for the operation and maintenance of the transmission line ROW.

Ground Electrode System

Following interim reclamation, there would be 52 acres of long-term habitat loss/fragmentation associated with the Bolten Ranch ground electrode facility and 15 acres of long-term habitat impacts associated with the Halfway Wash East facility. Of this total, only 6 acres of habitat impacts would be associated with the facilities themselves. The remaining habitat impacts would be primarily associated with access roads. Inspections and maintenance of ground electrode facilities would take place with the same frequency as for communication system components. These visits can be timed to avoid or minimize activity during sensitive time periods (e.g., greater sage-grouse breeding season around Bolten Ranch, desert tortoise activity periods around Halfway Wash East). Implementation of the Applicant-committed design features and mitigation measures, BMPs, and additional general and species-specific conservation measures would avoid or minimize impacts to federally listed, EXP/NE, and candidate wildlife species with potential to occur on the ground electrode facility sites.

Terminals

Long-term habitat impacts associated with the Northern and Southern Terminals would comprise 249 acres and 226 acres, respectively. Outside of this footprint, there would be some level of habitat degradation associated with noise and human activity, and night-lighting. Each of the terminals may have a control room that is staffed 24 hours a day, 365 days a year by 2 to 3 system operators and supervisory personnel. In addition to control room staffing, 8 to 20 technicians, engineers, maintenance, security, and supervisory personnel may be staffed at each terminal. Routine maintenance for the terminals would be performed by on-site staff. Major inspection or maintenance activities would, however, require additional personnel and equipment estimated at 15 to 20 craft, technician, engineering, manufacturer, consultant, and supervisory staff for a period of 2 to 4 weeks on an annual basis. These activities could result in temporary displacement of federally listed, EXP/NE, and candidate wildlife species from the immediate vicinity of the terminals. Both the terminals would have lighting installed inside the fence for safety and security reasons and for emergency night repair work, which is expected to be uncommon. Lights would be operational from dusk to dawn. Although night-lighting can affect bat behavior and distribution and can pose a hazard to nocturnally migrating birds during inclement weather, it is not expected to have a substantive impact on federally listed, EXP/NE, and candidate species with potential to occur in these areas.

5.2.3.3 Impact Avoidance and Minimization during Project Operation and Maintenance

Implementation of the applicant-committed design features and mitigation measures and additional conservation measures listed in **Table 2-7** and described in Chapter 3.0 would avoid and minimize impacts to federally listed, EXP/NE, and candidate wildlife species resulting from Project operation and maintenance. Relevant general measures include but are not limited to: TWE-1, TWE-2, TWE-3, TWE-6, TWE-8, TWE-12, TWE-24, TWE-26, TWE-29, TWE-31, TWE-32, TWE-45, TWE-58, TWE-61, TWE-62, TWE-64, SSWS-14, SSWS-15, SSWS-16, SSWS-22, WLF-1, WLF-2, WLF-5, WLF-6, WLF-7, WLF-10 NX-1, NX-2, VG-2, and VG-3. Applicable species-specific conservation measures are described in the individual species sections below.

5.2.4 Decommissioning Activities

Removal of project structures during decommissioning would result in the same types of impacts discussed for construction activities. Direct disturbance to wildlife habitat would occur as a result of vehicle and equipment traffic and increased levels of human activity in and along the ROW. The Applicant would be responsible for reclamation of access roads following abandonment in accordance with landowner's or land agency's direction. Many of the same BMPs and design features implemented

during construction would be applied to reduce impacts during decommissioning activities. Over time, reclamation and revegetation of the ROW and closed access roads would replace wildlife habitats lost or degraded during Project construction and operation. For portions of the line that are not located adjacent to other linear utilities and developed lands, previously fragmented habitats would once again become contiguous in areas where reclamation and revegetation efforts are successful.

5.3 Fish

5.3.1 Pre-construction Activities

With the exception of wetland delineations and, where necessary, habitat assessments and surveys for listed species with potential to occur in emergent and riparian wetlands, environmental surveys and subsequent engineering surveys and geotechnical investigations would occur in upland habitats and would have no effect on fish and other aquatic biota. No surveys for fish are currently anticipated and impacts to aquatic habitat from wetland delineations and habitat assessments or species-specific surveys would be brief and discountable. Geotechnical sampling would be conducted in tower locations, which are located on topographic high points rather than wetlands. Should it be necessary to place a tower in a floodplain, it would be located in upland habitat outside of the active floodplain and suitable habitat for listed species. While there is potential for indirect impacts to fish resulting from pre-construction activities, these impacts could easily be avoided using existing BMPs and Applicant-committed design features and mitigation measures.

5.3.1.1 Impact Avoidance and Minimization during Pre-construction Activities

Applicant-committed design features and mitigation measures and additional conservation measures relevant to avoiding and minimizing impacts to listed and candidate fish species from pre-construction activities include the following: TWE-1, TWE-2, TWE-4, TWE-5, TWE-31, TWE-34, TWE-61, TWE-62, SSS-1, and SSS-6. Applicable species-specific conservation measures are described in the individual species sections below.

5.3.2 Construction Activities

5.3.2.1 Transmission Line

Equipment and vehicle traffic within the ROW and access roads could cross small and moderate-size streams (generally less than 100 feet in wetted width) or springs. To the extent that these streams contain or are tributary to rivers, streams, and springs that contain federally listed and candidate fish species, Project-related crossings could result in direct or indirect impacts to these species.

Two types of crossings would be used for flowing streams: fords and culverts. The estimated disturbance per crossing for these two methods include 1,250 feet^2 (25-foot width x 50-foot length) for the ford technique, and 7,500 feet^2 (50-foot width x 150-foot length) for culverts. Flow would be maintained during construction involving stream crossings. If needed, culverts would be installed under the direction of a qualified engineer in coordination with hydrologists and aquatic biologists from the BLM, USFS, USACE, and state agencies. Compliance with necessary permits also would be required. For streams that contain fish, culverts would be designed to maintain or improve passage for fish species. Vehicle crossings would result in mortalities to macroinvertebrates and possibly early life stages of fish. Juvenile and adult fish would likely move from the disturbed area. Stream crossings also would alter bottom substrates. Habitat alteration could affect various activities or values for fish such as cover, feeding, or life stage functions for spawning or early life stage development.

Construction at stream crossings also would remove riparian vegetation. Vegetative cover along streambanks provides cover for fish, shading, bank stability, and increased food and nutrient supply as a result of deposition of insect and vegetative matter into the watercourse. Riparian vegetation also contributes woody material to streams that is used for fish cover and can be part of forming habitat features such as pools. Disturbance to the streambank areas at stream crossings would represent a

relatively small width (portion of 250-foot-wide transmission line ROW on each streambank). Given the relatively small width of the disturbance area associated with an individual stream crossing, impacts would be considered low in relation to the entire stream system.

Vehicle and equipment disturbance within or near waterbodies could result in sedimentation of these waterbodies. Sediment entering the water column would be redeposited in areas downstream of the disturbed area. The extent of the sedimentation effect would depend on the flow conditions, substrate composition, stream configuration, and types of aquatic communities located within the affected areas. The indirect effects of sedimentation could range from potential detrimental effects on species behavior, physiological functions, or spawning (Waters 1995). In general, salmonid (trout) species are more sensitive to increased turbidity compared to many of the warmwater fish species. Sediment deposition in substrates used for spawning could detrimentally affect successful egg development. The impact level would be determined by fish species presence, the timing of the construction in relation to spawning periods, and the closest spawning areas to the disturbance area. The duration of sediment impacts could last for several months to approximately 1 year depending on the timing of construction in relation to spring flows and other precipitation events that would flush sediments. The recovery period for biological communities could range from several months for macroinvertebrates to 1 year for fish (Waters 1995). The recovery period could be less if sediment levels were at relatively low concentrations.

Vehicle and equipment use within or near waterbodies also would pose a risk to aquatic biota from fuel or lubricant spills. If fuel reached a waterbody, aquatic species could be exposed to toxic conditions. Spills also would result in chemical residues within or on substrate in waterbodies. Impacts could include direct mortalities or reduced health of aquatic organisms. The magnitude of impacts would depend on the volume of spilled fuel, flow conditions, channel configuration, and presence of aquatic species.

Stream crossings by vehicles and equipment pose a risk of transferring invasive aquatic species between drainages during construction. Aquatic invasive species of concern in the four states traversed by the Project include whirling disease, zebra and quagga mussels, New Zealand mudsnail, and rusty crayfish. Various life stages of these invasive species could attach to vehicles or equipment and be introduced to a waterbody during the waterbody crossings associated with construction and maintenance activities. Management plans (e.g., UDWR 2009; WGFD 2010b) or regulations are being used by federal and state agencies to prevent the spread of these aquatic invasive species.

The estimated water use required per mile of transmission line construction is approximately 3,400 gallons for foundation concrete and 240,000 gallons for dust control. Water would be obtained from municipal sources, commercial sources, or a temporary water use agreement with landowners or irrigation companies holding existing water rights. As water sources are identified, a determination would be made whether the water counts towards the amount covered by the depletion consultation, based on an evaluation of their potential surface flows, groundwater connection, or if covered by existing consultations.

5.3.2.2 Ancillary Facilities

Communication System

The proposed fiber optic regeneration/repeater stations would have a total maximum disturbance footprint of 4.6 acres primarily located within the proposed ROW and spread along the length of the Project. Due to the small size of these facilities and the ability to site them in locations that avoid impacts to aquatic habitats, they are expected to have no impact on federally listed and candidate fish species.

Similarly, any new microwave antenna towers needed for the secondary communications path would be few in number and sited on topographic high points. Water requirements associated with construction of the communication system are expected to be minimal relative to those calculated for construction of the transmission line. Thus, potential impacts to federally listed and candidate fish from water withdrawals for communication system construction are expected to be negligible. Consequently, no impacts to federally

listed and candidate fish species are anticipated as a result of Project communication system construction.

Ground Electrode System

The Bolten Ranch Ground Electrode Facility site is located adjacent to Little Sage Creek and intermittent tributaries to this stream bisect the site. Consequently, construction of this facility would have potential to contribute sediment to Little Sage Creek with downstream impacts as described above. Little Sage Creek is tributary to the North Platte River, which in turn is tributary to the Platte River. The federally endangered pallid sturgeon occurs in the Platte River but any sediment contributed to Little Sage Creek as a result of ground electrode facility construction would be expected to have no impact on this species.

Similarly, the Halfway Wash East Ground Electrode Facility is located adjacent to an ephemeral wash that is tributary to the Virgin River. Construction of this facility would have potential to contribute sediment to the Virgin River in the event there was a flash flood in this area during construction of the facility. The incremental increase in sediment above what would naturally flow into the river during such an event and the low probability of such an event occurring during construction suggest that potential impacts to the Virgin River chub and associated critical habitat resulting from construction of this facility are highly unlikely.

Water requirements associated with construction of the ground electrode facilities would be minimal relative to estimated water needs for construction of the transmission line. Thus, potential impacts to federally listed and candidate fish from water withdrawals for communication system construction are expected to be negligible.

Terminals

Northern Terminal

Construction of the Northern Terminal would not result in direct disturbance effects, since waterbodies (i.e., Eightmile Lake and Separation Creek) located within the proposed siting area do not contain federally listed or candidate fish species. In addition, road access would not adversely affect special status fish species because existing or new roads would not cross waterbodies inhabited by these species. In summary, surface disturbance and use of access roads would not adversely affect special status aquatic species, since habitat is not located within the proposed disturbance area for the Northern Terminal.

Water use for terminal construction would require approximately 1.8 acre-feet for dust control. Water would be obtained from municipal sources, commercial sources, or a temporary water use agreement with landowners or irrigation companies holding existing water rights. The effect determination of new and existing water depletions in Wyoming would be made by the Wyoming State Engineer. Whether or not construction water use could affect surface flows for species using the Platte River system such as pallid sturgeon is discussed in Section 5.4, below.

Southern Terminal

Construction of the Southern Terminal would disturb upland areas in the Eldorado Valley watershed near Boulder, Nevada. The only waterbody located adjacent to and downslope of the siting area is a large playa lake. No perennial waterbodies are located in this area. No special status aquatic species habitat is located within the playa lake. Thus, surface disturbance and use of access roads would not adversely affect federally listed and candidate fish species, since there is no habitat located within the proposed disturbance area for the Southern Terminal.

Water required for the construction of the Southern Terminal is estimated to be 1.2 acre-feet. The source of the water would be existing rights. The effect determination of new and existing water depletions would be made after the water sources are identified and an evaluation of their potential connection to

surface flows is completed. Consultation with the USFWS would be completed to determine if construction water use could affect federally listed fish species and their critical habitat in the Colorado River Basin.

5.3.2.3 Impact Avoidance and Minimization during Construction Activities

Implementation of the applicant-committed design features and mitigation measures and additional conservation measures listed in **Table 2-7** and described in Chapter 3.0 would avoid and minimize impacts to federally listed and candidate fish species resulting from Project construction. Relevant general measures include but are not limited to: TWE-1, TWE-2, TWE-3, TWE-4, TWE-5, TWE-6, TWE-8, TWE-9, TWE-12, TWE-13, TWE-16, TWE-19, TWE-20, TWE-21, TWE-22, TWE-23, TWE-24, TWE-25, TWE-29, TWE-31, TWE-32, TWE-33, TWE-34, TWE-57, TWE-58, TWE-59, TWE-61, TWE-62, NX-2, WET-1, WET-3, AB-1, AB-2, AB-3, AB-4, and SSS-1, SSS-2, SSS-3, SSS-4, and SSS-11. Applicable species-specific conservation measures are described in the individual species sections below.

5.3.3 Operation and Maintenance Activities

5.3.3.1 Transmission Line

The direct and indirect effects of operation of the Project would involve use of access roads and the ROW for repair and maintenance activities and vegetation management. Impacts associated with operation activities would involve several of the same types of effects discussed for construction activities.

Direct disturbance to stream habitat would occur due to vehicle traffic during the annual transmission line inspection and vegetation clearing. In most situations, vehicles would use existing access roads. However, movement along the ROW may require crossings of small streams where access roads do not exist. It is assumed that fewer stream crossings may be required because the access road system would have been constructed. Project design would limit stream crossings if feasible. Some of the roads that cross streams would have culverts to protect the waterbody from future vehicle disturbance. The types of direct impacts would be the same as discussed for construction. Some riparian vegetation may be trimmed to maintain the buffer zones from wires. However, the applicant would retain as much riparian vegetation as possible at stream crossings. BLM stipulations would protect riparian areas on public lands by restricting surface distance in these areas. The buffer distance varies from 100 to 500 feet. However, riparian stipulations do not exist for the entire analysis area. The reduction of riparian vegetation at stream crossings would result in the same types of impacts on aquatic habitat, as discussed for construction.

Operation activities would not permanently remove habitat and affect fish population numbers. Temporary reductions in macroinvertebrate numbers could occur at stream crossings, but this community would recover as they recolonize aquatic areas.

Stream crossings by vehicles and equipment pose a risk of transferring invasive aquatic species between drainages during operation and maintenance activities. Impacts would be similar to construction activities except that fewer stream crossings may be required, since the road access system would be established during construction.

Vehicle traffic within the ROW and access roads near streams could result in increased sediment and fuel spill risks. The effects of these water quality changes on aquatic habitat and species would be the same as discussed for construction. The same BMPs and design features would be applied to minimize these types of impacts on aquatic biological resources. Herbicides may be used to control vegetation as part of maintenance activities in the ROW. Adverse effects on aquatic species would be minimized by following the Herbicide Use Plan, as described in the TWE Plan of Development, Appendix N – Noxious Weed Management Plan, and applicable regulations regarding the selection of approved herbiciess and

application and cleanup techniques. Additional conservation measures involving herbicide use are described in NX-1, NX-2, NX-3, and AB-4.

5.3.3.2 Ancillary Facilities

Operation and maintenance of ancillary facilities including communication sites, ground electrode facilities, and the Northern and Southern Terminals would have no effect on waterbodies and, thus, no effect on special status fish species.

5.3.3.3 Impact Avoidance and Minimization during Operation and Maintenance Activities

Implementation of the applicant-committed design features and mitigation measures and additional conservation measures listed in **Table 2-7** and described in Chapter 3.0 would avoid and minimize impacts to federally listed and candidate fish species resulting from Project operation and maintenance. Relevant general measures include but are not limited to: TWE-1, TWE-2, TWE-3, TWE-9, TWE-12, TWE-24, TWE-31, TWE-32, TWE-61, TWE-62, NX-2, AB-2, and AB-4. Applicable species-specific conservation measures are described in the individual species sections below.

5.3.4 Decommissioning Activities

Removal of project structures during decommissioning would result in the same types of impacts discussed for construction activities. Direct disturbance to aquatic habitat would occur as a result of vehicle traffic across streams. The Applicant would be responsible for reclamation of access roads following abandonment in accordance with landowner's or land agency's direction. Water quality changes involving increased sediment and fuel spill risks would occur as a result of vehicle traffic within or near waterbodies. The potential spread of invasive aquatic species also could result from vehicle crossings and movement between drainages. Many of the same BMPs and design features would be applied to reduce impacts during decommissioning activities. Removal of riparian vegetation would not be required as part of decommissioning.

6.0 Environmental Baseline and Assessment of Effects

6.1 Federally Listed Threatened and Endangered Species

6.1.1 Mammals

6.1.1.1 Canada Lynx (Threatened)

Environmental Baseline

Conservation Status

The contiguous U.S. Distinct Population Segment (DPS) of the Canada lynx was designated as threatened on March 24, 2000 (65 Federal Register [FR] 16051). This DPS includes lynx inhabiting forested portions of multiple states, including Colorado and Utah. In response to a 2002 court order, the USFWS reconfirmed the species' status as threatened (68 FR 40076). A Final Rule on revised critical habitat for the Canada lynx was issued in September 2014 (79 FR 54782). Designated critical habitat does not exist within the Canada lynx analysis area. A 5-year species status review was initiated in 2007 (72 FR 19549). Although a formal recovery plan has not been published for the Canada lynx, an interim Recovery Outline was issued in 2005 to guide recovery efforts and critical habitat designation for the DPS until a draft recovery plan is completed (USFWS 2005a).

The Canada lynx is broadly distributed across northern North America from the forested regions of eastern Canada to the northern border of Alaska. In the contiguous U.S., lynx historically occurred in the Cascades Ranges of Washington and Oregon; the Rocky Mountain Range in Montana, Wyoming, Idaho, eastern Washington; eastern Oregon, northern Utah, and Colorado; the western Great Lakes Region; and the northeastern U.S. region, from Maine southwest to New York. The species is strongly associated with boreal forests and its range coincides with that of its primary prey, the snowshoe hare.

The southern periphery of the North American boreal forest region extends into parts of the northern contiguous U.S., where it transitions to Acadian forest in the Northeast, deciduous temperate forest in the Great Lakes region, and subalpine forest in the Rocky Mountains and Cascade Mountains. These transitional boreal forests are fragmented, preventing both lynx and snowshoe hares from achieving densities as high as those of the northern boreal forests of Canada and Alaska (USFWS 2014d). The Canada lynx remains fairly widespread throughout its northern range but has receded from much of the southern periphery of its former range. In Utah, lynx have been documented in the Uinta Range (Ruediger et al. 2000). A few records also exist from the Wasatch Range and the Manti-La Sal National Forest. However, it is unlikely that the La Sal or Abajo mountains ever supported a resident lynx population, given the scarcity of records and the absence of snowshoe hares. The last verified records of lynx from Utah were physical remains in 1977 and tracks in 1982. The lynx has been protected from harvest since 1974, and is listed as a sensitive species by the State of Utah (Ruediger et al. 2000).

Until recently, it was generally assumed that the lynx was an indigenous but uncommon species in the southern Rocky Mountain geographic area. However, both Allen (1874) and Cary (1911) indicate that lynx may have been relatively common in Colorado, at least near or prior to 2000 (Ruediger et al. 2000). Despite the lack of recent specimens, evidence indicates lynx have persisted to the present, but are rare in the ecosystem. Severe reduction of lynx in Colorado led the Colorado Division of Wildlife (CDOW), now known as Colorado Parks and Wildlife (CPW), to undertake reintroduction efforts that are ongoing. CPW released 218 wild-caught adult lynx from Alaska between 1999 and 2006. Of the 218 lynx released, at least 122 (56 percent) died by June 2010 (USFWS 2013a).

In 2006 critical habitat was designated in Minnesota, Montana, and Washington; however, there is no critical habitat within the analysis area for this project.

Life History and Habitat Association

Canada lynx require early, mid-, and late successional forested habitats. Early and mid-successional forests are utilized for hunting snowshoe hares, and late successional forests are utilized for denning and raising kittens. Uneven-aged stands with relatively open canopies and well-developed understories are suitable habitat for snowshoe hares and consequently Canada lynx (Armstrong et al. 2011). In the northern portion of their range, boreal forests are preferred Canada lynx habitat; however, in the Intermountain West, spruce-subalpine fir and lodgepole pine forests are preferred. Canada lynx are negatively associated with topographic complexity, and typically occur where low topographic relief creates a continuous forest with variable aged trees. In Wyoming, the species occurs above 6,500 feet and in Colorado and Utah, Canada lynx typically occur above 8,000 feet (Ulev 2007).

Canada lynx are highly mobile with large home ranges spanning a variety of forested habitats. Home range size can vary between 6 and 85 square miles, depending on the sex; age; population density; prey density; and survey method used. Home ranges for males are generally larger than for females (Ulev 2007).

Densities of Canada lynx populations in northern boreal forests are highly correlated with the abundance of snowshoes hares, and lynx density fluctuates greatly with cycles of snowshoes hare populations (an approximate 10-year population cycle). During peak hare populations, lynx density can reach 30 to 45 individuals per square kilometer (km). The approximate10-year population cycle of Canada lynx occurs in phases, coinciding with the snowshoe hare cycle. The “low population density phase” lasts 3 to 5 years. The “population increase phase” lasts approximately 3 years and is a result of high fecundity, high kitten survival, and low adult mortality. The “peak phase” lasts approximately 2 years, with little population growth. The “crash phase” occurs 1 to 2 years following the crash in the snowshoe hare population, and is due to high natural mortality, a decline in recruitment, and increased dispersal rates (Ulev 2007).

In the southern periphery of their range, where snowshoe hare densities are lower, average lynx density is three individuals per square km (Armstrong et al. 2011). Populations of snowshoes hares in southern areas do not appear to fluctuate cyclically, and this could make lynx populations more stable (Armstrong et al. 2011). Reasons for an apparent absence of population cycles could include greater habitat fragmentation; lower, but more stable snowshoe hare populations; the presence of predators and competitors that do not occur in northern areas; and/or lynx predation on alternative prey species (Ulev 2007).

Lynx are polygamous and females are believed to be seasonally polyestrous. Most lynx breeding occurs in March and April (Armstrong et al. 2011). Gestation lasts for approximately 60 to 65 days (Ulev 2007). Lynx typically produce 1 litter per year, with 1 to 6 young (average 3), but can produce up to 4 litters in a season. Males do not help with the rearing of kittens, and the young disperse in the fall or the following spring after learning to hunt from their mothers (Armstrong et al. 2011). Lynx are primarily solitary and nocturnal; however, they have been observed travelling in pairs or with their young and hunting cooperatively (Armstrong et al. 2011).

Snowshoe hares are the primary prey of lynx, comprising 35 to 97 percent of the diet throughout the range of the lynx. Other prey species include red squirrel, grouse, flying squirrel, ground squirrel, porcupine, beaver, mice, voles, shrews, fish, and ungulates as carrion or occasionally as prey (Ruediger et al. 2000). Most research has focused on the lynx winter diet, and diets in the summer are poorly understood throughout the species’ range. The lynx summer diet includes a greater diversity of prey species (Ruediger et al. 2000). Mowat et al. (2000) reported through their literature review that summer diets include less snowshoe hare and more alternative prey, possibly because of a greater availability of alternative prey species. Southern populations of lynx could prey on a wider diversity of species than northern populations because of lower average hare densities and differences in other small mammal communities. In areas characterized by fragmented lynx habitat, the species could prey

opportunistically on other species that occur in adjacent habitats, including white-tailed jackrabbit, black-tailed jackrabbit, greater sage-grouse, and Columbian sharp-tailed grouse (Ruediger et al. 2000).

Threats

Persistence of the Canada lynx in the contiguous U.S. appears to be dependent on dispersal from larger populations and maintenance of connectivity between northern and southern populations (Schwartz et al. 2002). For lynx in Wyoming and Colorado, this requires maintaining connectivity between populations in those states, and between populations that could disperse from Canada into Montana and subsequently Wyoming (Schwartz et al. 2002). Threats affecting the Canada lynx include human alteration of forested habitat, including tree distribution and abundance, species composition, successional stages, and connectivity of forests; and the resulting changes in carrying capacity to sustain lynx populations. Humans have altered forests through timber harvest, fire suppression and conversion of forest lands to agriculture. Forest fragmentation could eventually become severe enough to isolate suitable lynx habitat into small areas, thereby reducing the viability of lynx populations that are dependent on larger areas of forest habitat (USFWS 2005a). In addition, one of the primary reasons for listing the Canada lynx is the residual effect of excessive trapping pressure that is believed to have occurred in the 1970s and 1980s (USFWS 2005a). Lynx also have been threatened by inadequacy of existing regulatory mechanisms. Other factors that could pose a threat to lynx population viability include: high traffic roads that bisect lynx habitat and negatively affect lynx behavior and movement, and human alteration of habitat that has led to an increase in lynx competitors such as coyote, bobcat, and mountain lion (USFWS 2005a).

Recovery

Initially, the USFWS identified the main threat to the Canada lynx contiguous U.S. DPS as the inadequacy of existing regulatory mechanisms to protect the species and its habitat; particularly the lack of protection conferred by USFS LRMPs (65 FR 16051). To address this inadequacy, the USFS, BLM, and USFWS developed the Lynx Conservation Assessment Strategy (LCAS) to provide a consistent and effective approach to conserve Canada lynx on federal lands across the contiguous U.S. (Ruediger et al. 2000). The LCAS included the identification of Lynx Analysis Units (LAUs). LAUs are based upon 5th and 6th level HUCs, and a HUC becomes a LAU when at least 30 percent of the HUC is suitable Canada lynx habitat. LAUs have been identified in suitable lynx habitat throughout lands managed by the USFS and BLM. With the exception of lynx habitat management plans on some private and state lands in Washington, no management plans that specifically address lynx conservation exist for the remainder of the contiguous U.S. (USFWS 2005a).

The USFS and BLM signed 4-year Conservation Agreements with the USFWS in 2000. The USFS agreement was revised and renewed in 2005 (USFS and USFWS 2005). The BLM agreement has not been renewed, although the agency continues to work within the agreement. Under the USFS and BLM agreements, lynx habitat was mapped on all USFS and BLM managed lands across the contiguous U.S. and Section 7 consultation is required on these lands. Determination of project effects on lynx is based on the most current science, including the LCAS (Ruediger et al. 2000).

The USFWS preliminary recovery strategy lists the recovery priority number for Canada lynx as 15, on a scale of 1C (highest) to 18 (lowest). This ranking is based on a low degree of threat; a high potential for recovery; and a taxonomic classification as a Distinct Population Segment under the ESA (USFWS 2005a). According to the preliminary recovery strategy, the recovery goal is to address threats to the Canada lynx so that protection of this species under the ESA is no longer required, and delisting is warranted.

Based on historic and recent evidence, lynx habitat and occurrence within the contiguous U.S. can be categorized as: 1) core areas, 2) secondary areas, and 3) peripheral areas. The areas with the strongest long-term evidence of lynx population persistence within the contiguous U.S. are defined as “core areas.” Core areas have both persistent verified records of historic lynx occurrence and recent

evidence of reproduction. Six core areas and one “provisional” core area are identified within the contiguous U.S. (USFWS 2005a).

Recovery of the lynx will be achieved when conditions have been attained that will allow lynx populations to persist long-term within each of the identified core areas. The following preliminary recovery objectives and measures have been established by the USFWS in order to progress towards delisting the lynx.

- Objective 1: Retain adequate habitat of sufficient quality to support the long-term persistence of lynx populations within each of the identified core areas.
- Objective 2: Ensure that sufficient habitat is available to accommodate the long-term persistence of immigration and emigration between each core areas and adjacent populations in Canada or secondary areas in the U.S.
- Objective 3: Ensure that habitat in secondary areas remains available for continued occupancy by lynx.
- Objective 4: Ensure that threats have been addressed so that lynx populations will persist in the contiguous U.S. for at least the next 100 years.

USFWS Recovery Actions needed to attain objectives:

1. Establish management commitments in core areas that will provide for adequate quality and quantity of habitat such that there is a reasonable expectation that persistent lynx populations can be supported in each of the core areas for at least the next 100 years.
2. Maintain baseline inventories of lynx habitat in each core area, monitoring changes in structure and the distribution of habitat components.
3. Monitor lynx use in lynx analysis units (as defined in Ruediger et al. 2000) or other appropriate management units at least once every 10 years to determine distribution and occupancy within the core area.
4. Develop habitat facility movement between each core area and lynx populations in Canada.
5. Ensure that habitat in secondary areas remains available for occupancy by lynx.
6. Identify population and habitat limited factors for lynx in the contiguous U.S.
7. Develop a post-delisting monitoring plan.

Core Areas of Canada lynx habitat ensure the continued persistence of lynx in the contiguous U.S. by providing:

- Representation by conserving the breadth of ecological settings of the DPS;
- Redundancy by retaining a sufficient number of populations to provide a margin of safety to withstand catastrophic events; and
- Resiliency by maintaining sufficient numbers of animals in each population to withstand randomly occurring events and prey population dynamics.

Provisional Core Area has been designated in the southern Rocky Mountains in Colorado and Wyoming. Criteria include:

- Verified evidence of long-term historical and current presence of lynx populations;
- Recent (within the past 20 years) evidence of reproduction;
- Average snowshoe hare densities over time are at least 0.5 hare/hectare;

- Contains a minimum of 483 square miles of boreal forest habitat (can include boreal forest habitat directly adjacent in Canada). Habitat patches must be sufficiently large and connected to enable movement within and between patches within a core area; and
- Snow conditions favor the competitive advantage of Canada lynx.

No Secondary Habitat Areas are designated in the southern Rocky Mountains. Peripheral Habitat Areas could enable successful dispersal of lynx between populations or sub-populations. Peripheral lynx habitat has been identified in Utah (79 FR 54782). Criteria include:

- Few historic or recent verified records of lynx exist for the area; and
- Habitat occurs in small patches and is not well-connected to larger patches of high quality habitat.

Assessment of Effects

Area of Analysis

The Canada lynx analysis area is defined as potential habitat (aspen forest and woodland, conifer forest, and tundra vegetation communities) within the action area, as defined in Section 2.2. The lynx analysis area includes 18,325 acres of potential Canada lynx habitat and is depicted in **Figure 6-1**.

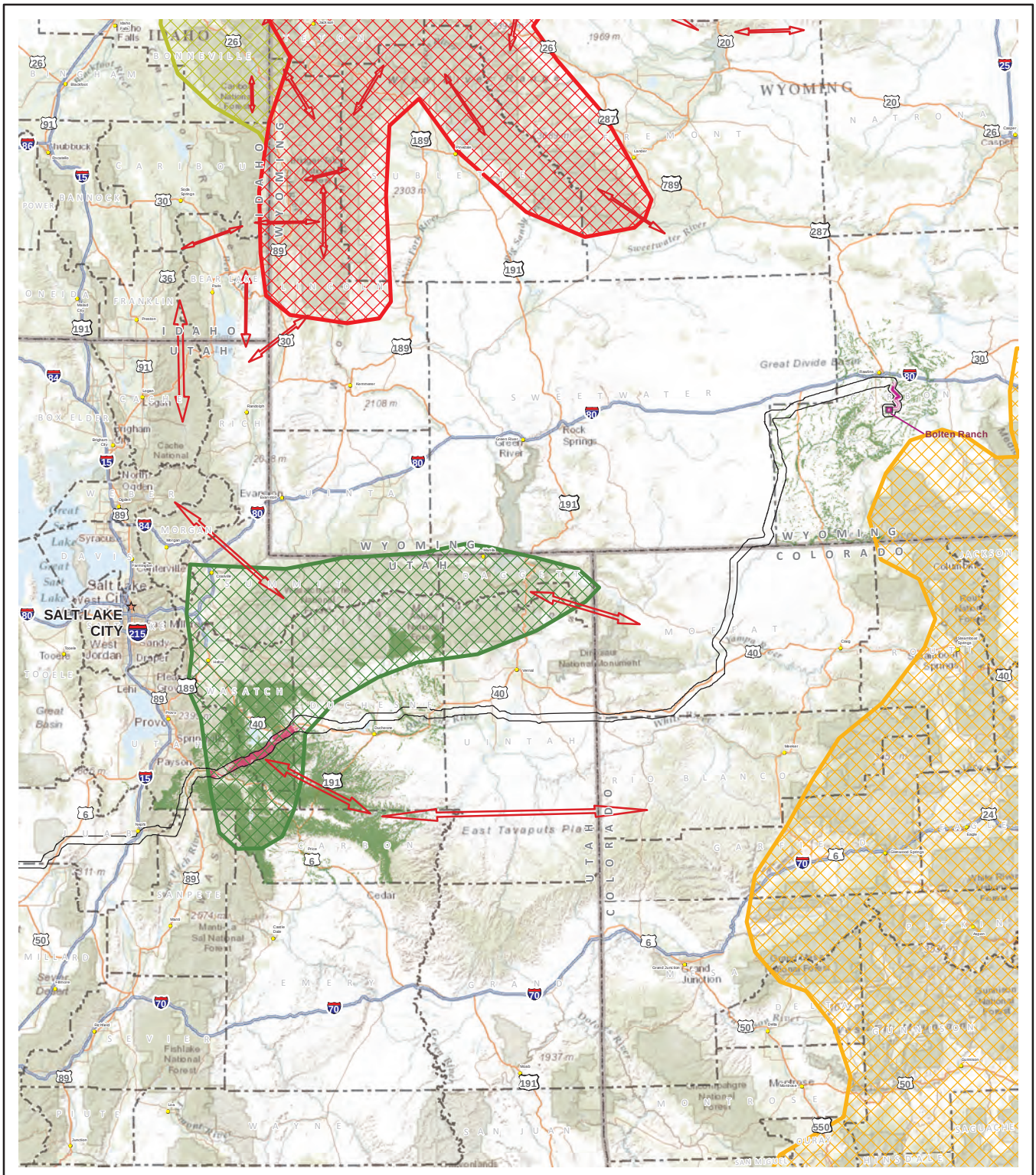
The Canada lynx could occur within high elevation forests in northeastern Utah, primarily in the Ashley and Uinta-Wasatch-Cache National Forests (USFS 2007), and in the Routt National Forest in northwestern Colorado (USFS 2006). Although this species is extremely rare in Utah, transient Canada lynx from Colorado have been documented within 5 miles of the analysis area in Uintah County, Utah (UNHP 2010). Existing lynx habitat in Utah has been identified as “peripheral” by the USFWS (79 FR 54782). Peripheral habitat is characterized as sub-optimal habitat where the capacity to support adequate snowshoe hare or lynx populations is questionable. In areas of potentially suitable peripheral habitat within the Canada lynx analysis area there is no evidence of long-term presence or reproduction that might indicate colonization or sustained use of these areas by lynx (Interagency Lynx Biology Team 2013). The Canada lynx analysis area also encompasses identified “linkage areas” in northeastern Utah and northwestern Colorado (**Figure 6-1**, USFS 2007). Linkage habitat is defined as areas that facilitate movements of lynx beyond their home range, such as dispersal, breeding season, or exploratory movements. Linkage areas typically incorporate topographic features that tend to funnel animal movements and might encompass areas of non-lynx habitat (Interagency Lynx Biology Team 2013). To the extent that lynx use these linkage areas, they could traverse the action area in Moffat County, Colorado, when travelling back and forth between the Routt and Ashley National Forests.

A reproducing lynx population has been established in south-central Colorado as a result of a reintroduction program initiated in 1999 by the CPW. Individuals from this population have been documented in northern Colorado and Utah.

Conservation Measures

Impacts to Canada lynx habitat would be minimized through implementation of the following design features and conservation measures described in Chapter 3.0:

- Applicant-committed conservation measures and design features: TWE-1 – TWE-5, TWE-9, TWE-12, TWE-26 – TWE-28, TWE-31, TWE-33, TWE-34, and TWE-64.
- Conservation measures: **WLF-6, WLF-10,** and **SSWS-15**.


SALT LAKE CITY
Bolten Ranch
WYOMING
COLORADO
UTAH
IDAHO
Great Divide Basin
Great Salt Lake
Rock Springs
Green River
East Tavaputs Plateau
Cedar
Grand Junction
Montrose
Dinosaur National Monument
Flaming Gorge Reservoir
Sweetwater River
Uinta Mountains
Wasatch Mountains
Wasatch Plateau
Book Cliffs
Canyonlands
Fishlake National Forest
Manti-La Sal National Forest
Uncompahgre National Forest
Grand Mesa National Forest
Ashley National Forest
Routt National Forest
White River National Forest
Gunnison National Forest
Cache National Forest
Caribou-Targhee National Forest
Curecanti National Recreation Area
Action Area
Analysis Area
Canada Lynx Potential Habitat
Linkage Area (USFS 2003)
Lynx Recovery Areas
Core
Provisional Core
Secondary
Peripheral
Action Area Buffer for Analysis Area: None
Ground Electrode Siting Area
Ground Electrode Overhead Electrical Line
TRANSWEST EXPRESS TRANSMISSION PROJECT
Figure 6-1
Area of Analysis for Canada Lynx
0 10 20 40 Miles
0 10 20 40 km
1:3,000,000
N
Western AREA POWER ADMINISTRATION
Exported On: 4/2/2015
K:\Projects_4\TransWestExpress\12907_003_Transwest_Express\Figures\DocumentFigures\2015_BA_v2\SSWildlife\Fig_6_01_CanadaLynx.mxd

The following species-specific conservation measure would be implemented for the Canada lynx:

SSWS–11: To avoid or minimize impacts to Canada lynx, TransWest would:

1. Limit disturbance to and within suitable habitat by staying on approved access routes.
2. Limit new access routes created by the Project.
3. Dirt and gravel roads traversing lynx habitat (particularly those that could become highways) should not be paved or otherwise upgraded (e.g., straightening of curves, widening of roadway, etc.) in a manner that is likely to lead to significant increases in traffic volume, traffic speed, increased width of the cleared ROW, or would foreseeably contribute to development or increases in human activity in lynx habitat.

   Effectiveness: This conservation measure would minimize impacts to the Canada lynx and its habitat by restricting disruptive activities and limiting construction of new access roads.

Direct and Indirect Effects

Within the action area, Canada lynx potential habitat occurs only in Utah where it is relatively scarce and located in high elevation forests with dense tree canopies. These areas are primarily located in the Ashley National Forest and in the Uinta Planning Unit of the Uinta-Wasatch-Cache National Forest. Project-related disturbance is possible for lynx that could be dispersing through the area during construction or maintenance. However, individual lynx would likely avoid noise and human presence. Operation of the transmission line would not restrict lynx movement, and would allow dispersal. The proposed Project does not cross any LAUs in Utah. Therefore, impacts to the Canada lynx would be limited primarily to impacts including habitat loss and fragmentation.

Impacts to the Canada lynx habitat would include the construction and operation disturbance of 162 acres (0.9 percent) and 59 acres (0.3 percent), respectively, of peripheral lynx habitat within the analysis area. Impacts to lynx habitat would include the loss of potential cover and den locations consisting of large conifer trees and woody debris. Loss of available foraging habitat (e.g., early successional, high-tree-density areas with dense understory vegetation preferred by the snowshoe hare) would result in indirect impacts to the Canada lynx. In Utah, snowshoe hare (the primary lynx prey species) habitat exists within the analysis area in Duchesne, Wasatch, Utah, Sanpete, and Juab counties. Impacts to snowshoe hare habitat and the habitat of other prey species could indirectly impact to Canada lynx due to reduced foraging opportunities.

After considering design features and conservation measures, remaining Project construction and operation impacts to the Canada lynx would be limited to habitat loss and fragmentation, and potential disturbance during construction and routine maintenance activities. This disturbance is anticipated to have very little effect on Canada lynx, given the infrequency of lynx activity within the Project disturbance areas and the extent of native habitats in the surrounding Project region.

Cumulative Effects

No reasonably foreseeable non-federal future actions have been identified within the vicinity of the proposed Project action area for the Canada lynx.

Monitoring

There are currently no known short- or long-term monitoring and reporting plans for Canada lynx in the Project analysis area.

Determination

Effect on the Species: The Proposed Action *may affect, but is not likely to adversely affect* the Canada lynx as a result of construction and operation of the proposed Project.

Effect on Critical Habitat: No critical habitat has been designated for the Canada lynx within the action area; therefore, there would be no effect on critical habitat.

Rationale: Construction and operation activities would be unlikely to directly affect the Canada lynx, since there have been no recent documented occurrences of lynx in the Canada lynx analysis area. The species is highly mobile and secretive and would likely avoid construction and maintenance activities along the ROW. The project would cross peripheral Canada lynx habitat in the Uinta-Wasatch-Cache National Forest in Utah and a linkage area in northwestern Colorado. However, the project is not expected to result in substantive long-term impacts that would affect the species ability to survive, reproduce, and/or disperse through the area.

6.1.1.2 Gray Wolf (EXP/NE in Wyoming, Endangered in Utah and Colorado)

Environmental Baseline

Conservation Status

The gray wolf (Northern Rocky Mountain Population) was designated as endangered on January 4, 1974 (39 FR 1175-1176). A wolf recovery team for the Northern Rocky Mountain Region was appointed in 1974 and a Recovery Plan was released on August 3, 1987 (USFWS 1987). In 1978, the USFWS published a rule (43 FR 9607, March 9, 1978) reclassifying the gray wolf as an endangered population at the species level *(Canis lupus)* throughout the conterminous 48 States and Mexico, except for the Minnesota gray wolf population, which was classified as threatened. In 1995 and 1996 the USFWS reintroduced 66 wolves from Canada into wilderness areas of central Idaho and Yellowstone National Park in Wyoming as EXP/NE (59 FR 60252, November 22, 1994) under Section 10(j) of the ESA (16 USC 1539(j)) with the goal of reestablishing a sustainable gray wolf population in the northern Rocky Mountains (Wyoming, Idaho, and Montana).

Between 2003 and 2008 the USFWS published several rules revising the 1978 conterminous listing for *Canis lupus* (68 FR 15804, April 1, 2003; 72 FR 6052, February 8, 2007; 73 FR 10514, February 27, 2008; 74 FR 15070 and 74 FR 15123, April 2, 2009) and each of these revisions was challenged in court. As a result of court orders and a settlement agreement, by the spring of 2010 the listing for the gray wolf (50 CFR 17.11) remained unchanged from the reclassification that occurred in 1978 (except for the addition of the three experimental populations (Yellowstone Experimental Population Area (59 FR 60252, November 22, 1994), Central Idaho Experimental Population Area (59 FR 60266, November 22, 1994), and the Mexican Wolf Experimental Population (63 FR 1752, January 12, 1998) (USFWS 2012a). On May 5, 2011, the USFWS published a Final Rule, reinstating the April 2, 2009, delisting rule which identified the Northern Rocky Mountain population of gray wolf as a DPS and, with the exception of Wyoming, removed gray wolves in the DPS from the List of Endangered and Threatened Wildlife (76 FR 25590).

On September 12, 2012 the USFWS released a Final Rule that delisted the gray wolf in Wyoming and removed it's designation as EXP/NE (77 FR 55530). On June 13, 2013 the USFWS published a Proposed Rule to remove the gray wolf from the List of Threatened and Endangered Wildlife but to maintain endangered status for the Mexican wolf by listing it as a subspecies (78 FR 35663). On February 20, 2015, the USFWS published a final rule reinstating the gray wolf's status in Wyoming as EXP/NE in compliance with a September 23, 2014, order by the U.S. District Court for the District of Columbia (80 FR 9218). The gray wolf currently remains listed as endangered outside of the Northern Rocky Mountain DPS, including most of Utah and Colorado, where it continues to be listed as endangered under the ESA.

The gray wolf occurs worldwide, ranging from Europe to northern Asia; however, it has been extirpated from much of its former range. In North America, the gray wolf once ranged from the southern border of Greenland south through mid-Mexico, coast to coast. The species occupied most regions of the U.S. except deserts and high mountaintops (Snyder 1991). By the time wolves were protected by the ESA of 1973, only a few hundred remained in extreme northeastern Minnesota and a small number on Isle Royale, Michigan (USFWS et al. 2011).

Natural recovery of the northern Rocky Mountain wolf population began in the early 1980s when wolf packs from Canada began to recolonize areas of northwestern Montana. In order to further facilitate recovery, in 1995 and 1996 wolves were reintroduced from southwestern Canada to remote public lands in central Idaho and Yellowstone National Park in Wyoming. These reintroductions, combined with mortality management, have greatly expanded the numbers and distribution of wolves in the northern Rocky Mountains. Subsequent management plans and regulations developed by the applicable States to maintain these recovered populations at healthy levels have led to the recent proposed delisting of gray wolves in most of the northern Rocky Mountains (USFWS 2012a).

By the end of 2011, the northern Rocky Mountain gray wolf population had exceeded, for the twelfth consecutive year, the numerical and distributional recovery goal (minimum of 30 breeding pairs and over 300 wolves well-distributed among Idaho, Montana, and Wyoming; and contained a minimum population estimate of over 1,700 wolves and over 100 breeding pairs. This is a slight increase from 2010 estimates despite State run harvests that took over 300 wolves in 2011. This population is about five and a half times higher than the minimum population recovery goal and about three and a half times higher than the breeding pair recovery goal (USFWS 2012a).

No critical habitat has been designated for the Northern Rocky Mountain population of the gray wolf.

Life History and Habitat Association

Wolves utilize a broad spectrum of habitats and are considered to be habitat generalists. Key components of wolf habitat include: 1) a sufficient year-round prey base of ungulates (big game) and alternate prey species, 2) suitable and somewhat secluded denning and rendezvous sites (resting and gathering areas occupied by wolves after den has been abandoned), and 3) sufficient habitat with minimal exposure to humans (USFWS 1987).

Wolves are social animals that live in groups, called packs, which typically include a breeding pair (the alpha pair), their offspring, and other non-breeding adults. Wolves are capable of mating by age two or three and often form lifelong bonds. They can live for up to13 years and breed past 10 years of age (USFWS 2011g). In most wolf populations, reproductive packs occupy exclusive territories, and nonbreeding individuals either live in areas between territories or avoid the packs. These territories are a means of partitioning food resources in areas where prey is randomly distributed and does not undergo major seasonal movements (USFWS 1987). Pack territories can range in size from 50 square miles to over 1,000 square miles, depending on the available prey and their seasonal movements. Most wolf pack territories range from 20 to 200 square miles. Wolves travel over large areas to hunt, sometimes as far as 30 miles in a day. Although they usually trot at 5 miles per hour, wolves can run as fast as 40 miles per hour for short distances (USFWS 2011g).

The breeding season for wolves occurs from late January through April. Pups are born between late March and May after a gestation period of approximately 63 days. Litter size ranges from four to seven pups (USFWS 1987). Gray wolves often excavate natal dens in well-drained soils in meadows near water and could use the same den for several years. They also will den under tree roots, rock outcrops, or even in hollow logs. After 1 to 2 months, these natal dens are abandoned and the wolves move to an open area called a rendezvous site where pups are guarded by a few adult pack members while the rest of the pack hunts. Most wolves disperse from their natal grounds at ages ranging from 9 to 28 months. However, in areas with a high density of wolves, dispersal might not occur at all (USFWS 1987).

Gray wolves prey primarily on large ungulates, such as moose, deer, elk, and caribou, often concentrating on the young, old, and sick members of ungulate populations. Voigt et al. (1976) reported that the gray wolf diet varies, depending on relative prey abundance. Other prey species include mountain goats, bison, pronghorn, various rodents, upland game birds, waterfowl, snowshoe hare, and black bear. Occasionally gray wolves prey on domestic livestock (Snyder 1991).

Threats

The population decline of wolf populations within the U.S., including those in the Northern Rocky Mountain region, was the result of: 1) intensive human settlement, 2) direct conflict with owners of domestic livestock, 3) a lack of understanding of the species' ecology and habits, 4) fears and superstitions concerning wolves, and 5) extreme control programs designed to eradicate the species (USFWS 1987). Threatened Wildlife of the U.S. (USFWS 1973) lists the primary reasons for the decline of the Northern Rocky Mountain wolf population as: land development, loss of habitat, poisoning, trapping, and hunting.

Recovery

At the start of the most recent 5-year review (USFWS 2012a), the Recovery Priority Number for the gray wolf was 15C. This number indicates that the species faces a low degree of threat; has a high recovery potential; and is in conflict with construction, development, or other forms of economic activity. The original 1980 Northern Rocky Mountain Gray Wolf Recovery Plan objective was to re-establish and maintain viable populations of the species in its former range where feasible (USFWS 1980). However, the plan did not contain any recovery goals. The 1987 revision did include a recovery goal, which was later re-evaluated and modified several times between 1994 and 2009.

Natural re-colonization of wolves in northwestern Montana and reintroductions in Idaho and in Yellowstone National Park, combined with mortality management, greatly expanded the number and distribution of wolves in the northern Rocky Mountains. Subsequent management plans and regulations developed by Idaho, Montana, and Wyoming wildlife management agencies serve to maintain these recovered populations at healthy levels and have led to the recent delisting of gray wolves in most of the northern Rocky Mountains (USFWS 2012a).

By the end of 2011, the Northern Rocky Mountain gray wolf population had exceeded the recovery goal of a minimum of 30 breeding pairs and over 300 wolves well-distributed among the 3 States (Idaho, Montana, and Wyoming) and contained a minimum population estimate of over 1,700 wolves and over 100 breeding pairs (USFWS 2012a). This population is approximately five and a half times higher than the minimum population recovery goal and about three and a half times higher than the breeding pair recovery goal. On June 13, 2013, the USFWS published a Proposed Rule to remove the gray wolf from the List of Threatened and Endangered Wildlife (78 FR 35663).

By every biological measure, the Northern Rocky Mountain Distinct Population Segment wolf population is fully recovered and remains secure under State management. Resident packs have saturated suitable habitat in the core recovery areas and the population has exceeded recovery goals for 13 consecutive years. This wolf population is expected to stabilize at a lower equilibrium based on natural carrying capacity in suitable habitat and human social tolerance (USFWS 2014a).

As the northern Rocky Mountain Distinct Population Segment wolf population has increased, minimum population estimates have become less precise. However, wolf populations in Montana, Idaho, and Wyoming far exceeded recovery goals at the end of 2013, and monitoring methods adequately documented this conclusion (USFWS 2014a).

The status of the northern Rocky Mountain Distinct Population Segment has consistently exceeded recovery goals since 2002. This is demonstrated by pack distribution and the number of individual wolves, packs, and breeding pairs in 2013. Documented dispersal of radio-collared wolves and effective dispersal of wolves between recovery areas determined through genetic research further

substantiate that the metapopulation structure of the northern Rocky Mountain Distinct Population Segment has been maintained solely by natural dispersal.

Potential threats to the gray wolf include the following five factors:

- The present or threatened destruction, modification, or curtailment of its habitat or range;
- Overutilization for commercial, recreational, scientific, or educational purposes;
- Disease or predation;
- Inadequacy of existing regulatory mechanisms; and
- Other natural or man-made factors affecting its continued existence (including public attitudes, genetic considerations, climate changes, catastrophic events, and impacts to wolf social structure)

In 2013, the USFWS analyzed these five factors as part of a proposed rule to delist the species (USFWS 2013). At that time, none of the five factors rose to a level that threatened survival and recovery of the northern Rocky Mountain Distinct Population Segment of the gray wolf. Delisting the species in portions of its range has not jeopardized the northern Rocky Mountain Distinct Population Segment wolf population, nor increased any risk to it. Biologically, wolves in the northern Rocky Mountain Distinct Population Segment remain recovered (USFWS 2014a).

Assessment of Effects

Area of Analysis

The gray wolf is a habitat generalist and the species is rare throughout its range in the Rocky Mountain region. Since the gray wolf utilizes a wide variety of habitats, the species may be present in any habitat type along any portion of the Project route in Wyoming, Colorado, and northern Utah. However, it is most likely to occur in areas away from human activity where game species are more abundant. Consequently, for the purposes of this analysis, we have assumed the gray wolf is associated with more mountainous habitats. Accordingly, the gray wolf analysis area is defined as potential habitat (aspen forest and woodland, conifer forest, montane grassland, montane shrubland, and tundra vegetation communities) within the Project action area defined in Section 2.2. These areas represent 35,336 acres of potential gray wolf habitat.

Although the potential for wolves to occur within the Project area is considered low, wolves that might be dispersing through the area during construction or maintenance activities could be adversely affected by the Project. However, such animals would likely avoid noise and human presence within the Project area. In August, 2014, there were confirmed sightings of a wolf on the south slope of the Uinta Mountains that had been radio-collared in northern Idaho (UDWR, Salt Lake Tribune, October 10, 2014). In December, 2014, a wolf that had been radio-collared in Cody, Wyoming, was accidentally shot by a hunter on the south end of the Tushar Mountains near Beaver, Utah (Salt Lake Tribune, December 29, 2014). These sightings were within about 25 miles and 35 miles of the action area, respectively. Given that these wolves had both traveled over 500 miles from their respective collaring locations, they could easily have traversed the proposed Project route in one or more locations; however, there have been no documented sightings of wolves any closer to the action area. Prior to these sightings, the most recent documentation of a wolf in Utah was in 2006.

Conservation Measures

Impacts to gray wolf potential habitat would be minimized through implementation of the following design features and conservation measures described in Chapter 3.0:

- Applicant-committed mitigation measures and design features: TWE-1 – TWE-5, TWE-9, TWE-12, TWE-26 – TWE-28, TWE-31, TWE-33, TWE-34, and TWE-64.
- Conservation measures: **WLF-6, WLF-10,** and **SSWS-15**.

Direct and Indirect Effects

The gray wolf could utilize any habitat type in mountainous regions present along the Project route in Wyoming, Colorado, or northern Utah. If gray wolves are present within the analysis area, both direct and indirect impacts could occur as a result of construction of the proposed Project. Direct impacts to gray wolves would include loss of foraging or denning habitat; habitat fragmentation; and animal displacement (both wolf and prey species). The proposed Project would result in the construction and operation disturbance of 4,015 acres (11 percent) and 1,054 acres (2.9 percent) respectively, of potential gray wolf foraging and denning habitat within the analysis area. Direct impacts to the gray wolves would be limited primarily to noise and human activity during construction. Effects on this species from long-term habitat modification are expected to be negligible.

Dispersing or roaming wolves could be disturbed during construction or maintenance. However, individual wolves would likely avoid noise and human presence. Thus, operation of the transmission line would not restrict wolf movement, and would allow dispersal. Habitat fragmentation disrupts the movements of large mammal prey species and foraging gray wolves. Impacts to large mammal and other prey species habitat could indirectly impact gray wolves due to reduced foraging opportunities. Indirect impacts would include increased noise and human activity associated with Project construction and operation, potential reductions in prey species populations within the project area resulting from disturbances, and changes in vegetation communities resulting from potential invasive and noxious weed infestations.

After considering design features and conservation measures, remaining Project construction and operation impacts to the gray wolf would be limited to fragmentation and incremental loss of potential habitat; disruption of prey populations; and disturbance during construction and routine maintenance activities. Given the infrequency of gray wolf activity in the Project action area and the extent of native habitats in the surrounding Project region, this disturbance is anticipated to have little impact on the species.

Cumulative Effects

No reasonably foreseeable non-federal future actions have been identified within the vicinity of the proposed Project action area for the gray wolf.

Monitoring

There are currently no known short- or long-term monitoring and reporting plans for gray wolf in the Project analysis area.

Determination

Effect on the Species: The Proposed Action *may affect, but is not likely to adversely affect* the gray wolf as a result of Project construction and operation.

Effect on Critical Habitat: Critical habitat has not been designated for the gray wolf.

Rationale: Given the infrequency with which gray wolves dispersing from Idaho and Wyoming have been documented in the vicinity of the action area, construction and operation activities are unlikely to result in any direct, adverse effects on this species. Furthermore, should dispersing wolves occur within the action area they would likely avoid construction and maintenance activities due to their highly mobile and secretive nature. Project-related impacts to habitat for large mammals and other prey species and temporary, construction-related displacement of these species from the action area could indirectly

impact any gray wolves in the area due to reduced foraging opportunities. However, these impacts would not be expected to result in any substantive, long-term impacts to this species.

6.1.1.3 Utah Prairie Dog (Threatened)

Environmental Baseline

Conservation Status

The Utah prairie dog was designated as endangered on June 4, 1973, due to a substantial decline in population from 1970 to 1972 (Pizzimenti and Collier 1975). In 1979 the UDWR petitioned the USFWS to remove the Utah prairie dog from the endangered species list. The USFWS published a Final Rule on May 29, 1984 (49 FR 22330), to reclassify the Utah prairie dog as threatened, with a special rule to allow for regulated take. In 2003, the USFWS received a petition to reclassify the species as endangered. In February 2004, the USFWS received a Notice of Intent to Sue for failure to issue a 90-day finding for the petition. Eventually the petitioning party and the USFWS reached a settlement agreement to make a 90-day finding on the petition by February 17, 2007. Published in the FR on February 21, 2007, the USFWS issued a notice of the 90-day petition finding that the petition failed to provide substantial scientific or commercial information to warrant the reclassification of the species to endangered status (72 FR 7843). With this determination, the USFWS also initiated a 5-year review of the species to determine whether the status of the Utah prairie dog should be changed. No critical habitat has been designated for the Utah prairie dog (USFWS 2012b).

The Utah prairie dog has the most restricted range of all prairie dog species in the U.S. and is limited to the southwestern quarter of Utah (USFWS 2012g). Historically, the species' distribution included portions of Beaver, Garfield, Iron, Kane, Juab, Millard, Piute, Sanpete, Sevier, Washington, and Wayne counties (USFWS 2012b). Currently, Utah prairie dogs are limited to the central and southwestern quarter of Utah in Beaver, Garfield, Iron, Kane, Piute, Sevier, and Wayne counties (USFWS 2012b). As of 2010, the majority of Utah prairie dog populations occurred in only three areas: the Awapa Plateau; the Paunsaugunt region along the east fork and main stem of the Sevier River; and the West Desert region of eastern Iron County (USFWS 2010f). Several isolated colonies also exist in the mountain and desert valleys in western Iron and Beaver counties (Pizzimenti and Collier 1975; USFWS 1991).

Historic abundance of the Utah prairie dog has been estimated at approximately 95,000 animals (USFWS 2012b). However, these estimates are not considered to be reliable because they were derived largely from informal interviews rather than actual survey data. Utah prairie dog populations began to decline when control programs were initiated in the 1920s, and by the 1960s the species' distribution was greatly reduced as a result of poisoning, sylvatic plague (a non-native disease), drought, and habitat alteration caused by agricultural and grazing activities (USFWS 1991). The exact magnitude of this decline is not known. However, by the early 1970s, the Utah prairie dog was eliminated from major portions of its historic range and its population had declined to an estimated 3,300 individuals, distributed among 37 colonies (USFWS 2012b).

Spring counts from the past 30 years show considerable annual fluctuations, but indicate stable to increasing long-term trends in adult Utah prairie dog numbers. Range-wide counts were as high as 7,527 in the 1989 spring census, with a low count of 1,866 animals in 1976 (USFWS 2012i). Recent Utah prairie dog population trends appear to be stable to increasing, although the species remains vulnerable to several serious threats, particularly urban expansion and sylvatic plague (USFWS 2012i).

Life History and Habitat Association

This species inhabits semi-arid shrub-steppe and grassland habitats in central and southern Utah, and is found at elevations ranging from approximately 4,900 to 9,800 feet amsl (USFWS 2012b). The Utah prairie dog prefers swale formations where moist vegetation is available even during times of drought (USFWS 1991). Because most of their water requirement is met through plant ingestion, there is a positive correlation between the amount of available moisture in vegetation and Utah prairie dog

population densities. Utah prairie dogs typically avoid areas where shrub species dominate, and will eventually decline or disappear in areas invaded by shrubs (Collier 1975; Player and Urness 1982). Vegetation within a colony must be low enough to allow a standing Utah prairie dog to scan the environment for predators and maintain visual contact with other members of the colony. However, this species has been known to occur in open pine-fir forests, such as in Bryce Canyon National Park (USFWS 2012b). Utah prairie dogs require well-drained soils for their burrows to be able to burrow deeply enough to be protected from predators and environmental temperature extremes (USFWS 1991).

The Utah prairie dog is a colonial species organized into social groups known as clans. A clan consists of an adult male, several adult females, and their offspring (Hoogland 2001). Colony population densities vary considerably, ranging from 6.25 per acre to more than 185 per acre. Habitat condition is the most likely influence on population density (Pizzimenti and Collier 1975).

Utah prairie dogs spend 4 to 6 months underground each year during winter (Hoogland 2001). Some observations suggest that Utah prairie dogs hibernate. However, other evidence suggests that at lower elevations Utah prairie dogs might enter torpor more intermittently at the beginning and end of the hibernation season and can be seen above ground in mild weather (USFWS 2012b). Adult males cease surface activity during August and September, followed by females several weeks later. Utah prairie dogs emerge from hibernation in late February or early March, with males emerging 1 to 3 weeks before females.

Utah prairie dogs have a lower rate of reproduction relative to other rodents. They begin mating a few days after emerging from hibernation (USFWS 2012b). Female Utah prairie dogs come into estrous, a period of greatest female reproductive responsiveness, only 1 day during the breeding season (Hoogland 2001). Approximately 97 percent of adult female Utah prairie dogs successfully breed each year. Litter sizes range from one to seven pups, with an average of 3.7 to 5.5 pups (USFWS 2012b). Utah prairie dog pups are born after a gestation period of 28 to 30 days, and depend almost entirely on nursing while in their burrow. Young Utah prairie dogs emerge from their nursery burrows when they are 5 to 6 weeks old, usually around mid-June. In late summer, young prairie dogs (mostly male) will disperse from their natal area, with average dispersal distances of 0.35 mile; long-distance dispersal distances of 0.75 mile; and unusually long-distance dispersal distances of 4 miles (USFWS 2012b). Most dispersing prairie dogs move to adjacent territories in suitable habitat.

Utah prairie dogs are primarily herbivores, though they also will eat insects. The species forages on grasses and forbs, often selecting those with higher moisture content. Forbs are consumed in the spring, and prairie dogs show a preference for alfalfa over grasses when both are present. Alfalfa is abundant in agricultural fields in Utah, and Iron County produces the second highest alfalfa harvest in Utah. Vegetation quality and quantity are essential for Utah prairie dogs to ensure survival during hibernation, lactation, and other periods of high nutrient demand. Plant species composition is correlated with increased weight gain; higher juvenile to adult population ratios; and higher population densities (USFWS 2012b).

Threats

In addition to natural population dynamics, site-specific prairie dog numbers are influenced by various environmental and human factors, including disease (e.g., epizootic plague); climate cycles; habitat loss, alteration, and fragmentation from environmental or human activities; and unlawful lethal take (USFWS 2012b).

The most recent 5-year review in 2010 indicates that threats to the Utah prairie dog include plague, urban expansion, overgrazing, cultivated agriculture, vegetation community changes, invasive plants, off-highway vehicle (OHV) and recreation uses, climate change, energy resource exploration and development, fire management, poaching, and predation (USFWS 2012b). Based on the Utah Prairie Dog Recovery Team's threat assessment results, urban expansion and plague comprise the most serious threats to Utah prairie dog populations. Threats of moderate concern include over-grazing,

OHV/recreational land uses, cultivated agriculture, vegetation community changes, and invasive plants. Threats of least concern include climate change, energy resource exploration and development, poaching, predation, and fire management (USFWS 2012b).

Recovery

The initial Recovery Plan for the Utah prairie dog was approved on September 30, 1991 (USFWS 1991). In March 2012, the USFWS issued a Revised Recovery Plan, which includes revised recovery criteria and updated actions that are likely necessary to achieve recovery (USFWS 2012g). In the Revised Recovery Plan, the USFWS redefined the designation of Utah prairie dog "recovery area" to "recovery units" (RUs). There are three RUs: the Awapa Plateau RU, the Paunsaugunt RU, and the West Desert RU. These RUs are geographically distinct and are essential to the conservation and recovery of the entire population of Utah prairie dogs. The USFWS recovery strategy for the Utah prairie dog focuses on the need to address habitat loss and fragmentation and disease through a program that encompasses threat abatement, population management, research, and monitoring (USFWS 2012b).

In 2010, the Recovery Priority Number for the Utah prairie dog was classified as 8C. The rank of 8C is based on a moderate degree of threat (conflicts with economic development activities and plague); a high degree of controversy regarding the species and its recovery; high recovery potential; and taxonomic standing as a species (USFWS 2012b).

The goal of the USFWS Recovery Plan is to recover the Utah prairie dog such that it no longer meets the ESA's definition of threatened and can be removed from the Federal List of Endangered and Threatened Wildlife (i.e., delisted). The recovery objectives (USFWS 2012b) for the Utah prairie dog include the following:

1. To protect suitable habitat that is of sufficient size to support a viable Utah prairie dog population and is spatially distributed to provide connectivity within each RU; and
2. To establish and maintain viable Utah prairie dog populations in each RU.

The best scientific and commercial information available indicates that all of the below criteria should be met to satisfy these recovery objectives and to allow USFWS to consider delisting the species.

1. At least 5,000 acres of occupied habitat are protected in perpetuity in each RU (West Desert, Paunsaugunt, and Awapa Plateau). These occupied habitat criteria will be spatially distributed to provide sufficient connectivity and gene flow within each RU;
2. At least 2,000 adult animals (at least 1,000 counted adults in the spring counts) are present in each RU (West Desert, Paunsaugunt, and Awapa Plateau) within protected habitat for 5 consecutive years;
3. Management strategies are in place to prevent and respond to threats from disease;
4. Education, outreach, and public relations programs and State and/or local regulations are in place and are sufficient to minimize illegal take, manage legal lethal control post-delisting, and foster habitat management practices; and
5. Utah prairie dog-specific adaptive management strategies are in place on protected lands to improve suitable habitat in a manner that will facilitate management responses to changing climatic conditions and other threat factors that are difficult to predict.

If the recovery actions are accomplished on schedule, recovery of the Utah prairie dog can be achieved by the year 2042 (USFWS 2012b).

Assessment of Effects

Area of Analysis

The Utah prairie dog analysis area is defined as suitable habitat within High- and Low-Intensity Level Survey areas traversed by the Project action area, plus a 0.5-mile buffer centered on the ROW. These areas represent approximately 133,840 acres of potential Utah prairie dog habitat and are depicted in **Figure 6-2**. The proposed Project would cross the West Desert Utah Prairie Dog RU. Within this RU, occupied Utah prairie dog colonies occur in Beaver and Iron counties. The proposed Project traverses High-Intensity-Level Survey Areas in these counties, but no occupied colonies were identified during 2014 surveys. A small, Low-Intensity-Level Survey Area occurs along the proposed Project in Millard County and was surveyed in 2013. No Utah prairie dog colonies were identified in this area.

The nearest occupied Utah prairie dog habitat in relation to the action area is located to the west of the Town of Lund, Utah. This mapped habitat includes a series of colonies called the West Lund Complex, which comprise colonies 0121a, 0121c, 0121e, and 0121g (**Table 6-1**). These colonies range from 0.43 mile (colony 0121g) to 1.83 miles (colony 0121a) from the edge of the analysis area. These colonies have exhibited very low spring counts since 2008. In fact, no prairie dogs were observed in this complex in 2010 and 2012 (**Table 6-1**). Unoccupied colony UN01T3SB097, the only Utah prairie dog site documented during surveys, is located approximately 3.44 miles from Colony 0121c (the closest colony with the West Lund Complex). Other than the West Lund Complex, the Utah prairie dog is not known to occupy the survey area or neighboring areas.

Low- and High-Intensity-Level surveys for this species were completed in 2013 and 2014, respectively. No occupied Utah prairie dog colonies were identified. However, one unoccupied/historic Utah prairie dog site was documented within the Utah prairie dog analysis area between milepost 196 and 197 in Iron County, Utah (AECOM 2014a). This unoccupied site is located approximately 700 feet from the project ROW. No recent Utah prairie dog activity was documented at this site; however, numerous historic mounds and burrows, and old scat were observed. Observations made at this location indicate that this site was likely previously used by Utah prairie dogs. A determination was made by BLM and UDWR to document this site as an unoccupied/historic site. There were several burrows that demonstrated the characteristics of a Utah prairie dog burrow; however, the majority of burrows displayed occupancy by other wildlife such as burrowing owls or ground squirrels. Old scat was present that had characteristic of Utah prairie dog scat; however, most of it appeared to have been excavated by the burrows current occupants. A determination was made to consider this an unoccupied/historic site. This unoccupied Utah prairie dog site encompasses approximately 32 acres on public land.

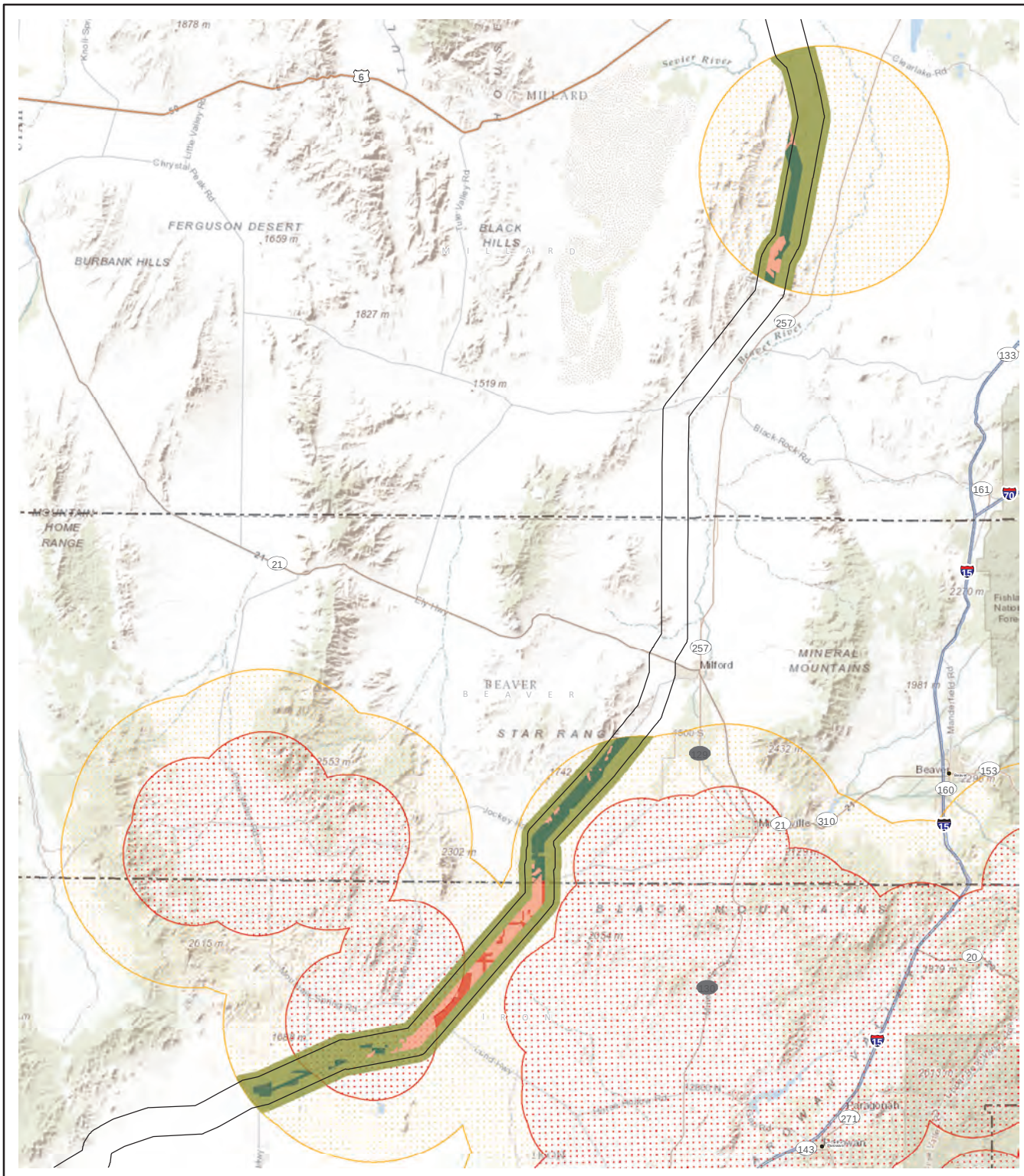
The Utah Prairie Dog Recovery Implementation Team (UPDRIT) identified 13 Population Focus Areas (PFA) within the current range of the species. PFAs are landscape level management areas identified as those areas most suitable for support of persistent Utah prairie dog populations. The TranWest refined transmission corridor would not cross any PFAs and therefore no impacts to PFAs are anticipated.

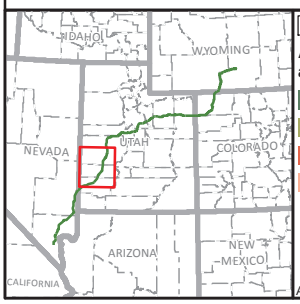
Conservation Measures

Impacts to the Utah prairie dog and its habitat would be minimized through implementation of the following design features and general conservation measures described in Chapter 3.0:

- Applicant-committed mitigation measures and design features: TWE-1 – TWE-5, TWE-9, TWE-12, TWE-26, TWE-27, TWE-28, TWE-31, TWE-33, and TWE-34.
- Conservation measures: **SSWS-15, NX-1**, and **NX-2**.

K:\Projects_4\TransWestExpress\12907_003_Transwest_Express\Figures\DocumentFigures\2015_BA_v2\SSWildlife\Fig_6_02_UTPrairieDog.mxd





Action Area

Analysis Area with Suitability and Survey Status

- Suitable - Surveyed
- Suitable - Unsurveyed
- Unsuitable - Field Verified
- Unsuitable

Utah Prairie Dog Survey Intensity

- High
- Low

Action Area Buffer for Analysis Area: 0.5 Mile

TRANSWEST EXPRESS TRANSMISSION PROJECT

Figure 6-2
Area of Analysis for
Utah Prairie Dog

0 3 6 12 Miles
0 3 6 12 km

1:750,000

N

Western AREA POWER ADMINISTRATION

Exported On: 3/31/2015

Table 6-1 Spring Counts for the West Lund Utah Prairie Dog Complex

Utah Prairie Dog Complex ID	Colony ID	Ownership	Distance from TWE Centerline	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
121	A - West Lund	BLM	2.3	31	27	33	10	18	40	66	2	1	0	0	2	0	1
121	A - West Lund	Private	2.3											0	0	0	0
121	B[1]	BLM	2.3	2	0	0		0	0	see 'A'	2	0	1	see A	see A	see A	0
121	C	Private	1.2	0	3	12		21	21	5	9	2	0	0	0	0	0
121	C	BLM	1.2						10	17	9	0	0	0	0	0	0
121	C	SITLA	1.2						0	0	0	0	0	0	0	0	0
121	D[2]	Private	1.2	0	4	3		4	see C	see C	see C	see c	see c	see C	see C	see C	0
121	D[2]	BLM	1.2	0	5	3		4						0	see C	see C	0
121	D[2]	SITLA	1.2	0	5	3		3						0	see C	see C	0
121	E	Private	1.0	0	0	3		0	0	0	0	0	0	0	0	0	0
121	E	SITLA	1.0										0	0	0	0	0
121	G	Private	0.9			5			0	0	0	0	0	0	0	0	0
121	G	SITLA	0.9											0	0	0	0

[1] Colony B was incorporated into Colony A in 2010.

[2] Colony D was incorporated into Colony C in 2005.

1

To reduce impacts to Utah prairie dogs, TransWest has conducted surveys to determine whether occupied habitat occurs within the disturbance footprint of the proposed Project. Surveys were conducted following USFWS protocols and did not identify any locations of occupied habitat within the Project refined transmission line corridor. If general pre-construction surveys identify active Utah prairie dog colonies within the action area, implementation of the following species-specific conservation measures would be required.

SSWS-7: To avoid or minimize impacts to the Utah prairie dog, TransWest would implement the following measure:

1. Pre-construction surveys during the active season, would be conducted according to approved methods, at a minimum of 2 weeks prior to surface disturbance within suitable habitat (as determined during 2013 and 2014 surveys), unless species occupancy and distribution information is complete, current, and available through coordination with local agencies (BLM, UDWR, and USFWS). Surveys would be conducted by USFWS-certified Utah prairie dog surveyors. In the event species occurrence is verified, consultation with USFWS would be re-initiated and TransWest may be required to modify operational plans, at the discretion of the authorized officer, to include additional appropriate protection measures for the minimization of impacts on the Utah prairie dog and its habitat.

   Effectiveness: This conservation measure would minimize impacts to the Utah prairie dogs that might be encountered prior to construction along the 250-foot-wide transmission line ROW.

2. All Project employees would be informed of the occurrence of the Utah prairie dog in the general area, and of the threatened status of the species. They would be informed of activities that constitute “take,” and the potential penalties (up to $200,000 in fines and 1 year in prison) for taking Utah prairie dogs, which are listed under ESA.

   Effectiveness: This conservation measure would minimize impacts to the Utah prairie dogs that might be encountered during construction along the 250-foot-wide transmission line ROW.

3. Project-related vehicle maintenance activities would be conducted in maintenance facilities. Should it become necessary to perform vehicle or equipment maintenance on-site, these activities would avoid identified Utah prairie dog colonies, or would be conducted outside of a 350-foot buffer surrounding the colonies. Precautions would be taken to ensure contamination of maintenance sites by fuels, motor oils, grease, etc., does not occur, and such materials are contained and properly disposed of off-site. Inadvertent spills of petroleum based, or other toxic materials would be cleaned up and removed immediately.

   Effectiveness: This conservation measure would minimize impacts to the Utah prairie dogs that might be encountered during construction along the 250-foot-wide transmission line ROW.

4. Construction equipment and materials extending beyond one breeding season (i.e., laydown yards) would not be staged within 0.5 mile of an occupied Utah prairie dog colony. Temporary laydown yards (that do not extend beyond more than one breeding season) may be approved within 350 feet of identified Utah prairie dog colonies; however, to ensure Utah prairie dogs do not move into these areas additional conservation measures such as silt fencing and barriers would be applied.

   Effectiveness: This conservation measure would minimize impacts to the Utah prairie dogs that might be encountered during construction along the 250-foot-wide transmission line ROW.

5. Reclamation and restoration efforts in suitable Utah prairie dog habitat would be conducted in accordance with the Vegetation Composition Guidelines for Utah Prairie Dog Habitat using native seed, unless otherwise specified in coordination with the USFWS and BLM.

   Effectiveness: This conservation measure would minimize impacts to Utah prairie dog potential habitat following construction of the proposed Project.

6. Project personnel would not be permitted to have firearms or pets in their possession while on the Project site within Utah prairie dog habitat.

   Effectiveness: This conservation measure would protect Utah prairie dogs that could be encountered during construction along the 250-foot-wide transmission line ROW by ensuring that they would not be shot; hunted or disturbed by pets; or exposed to disease by pets.

7. If a dead or injured Utah prairie dog is located, initial notification would be made to the USFWS Division of Law Enforcement, Utah FO at (801) 975-3330, to the Southern Region UDWR at (435) 865-6100, and to the BLM Authorized Officer at (435) 865-3000. Instruction for proper handling and disposition of such specimens would be issued by the Division of Law Enforcement. Care would be taken in handling sick or injured animals to ensure effective treatment, and care and in handling dead specimens to preserve biological material in the best possible state.

   Effectiveness: This conservation measure would minimize impacts to Utah prairie dogs that that could be encountered during construction along the 250-foot-wide transmission line ROW by ensuring proper care and handling of dead or injured individuals.

8. To limit the potential for adverse impacts resulting from contact with construction equipment, vehicles, and personnel, TransWest would implement a project area vehicle speed limit of 15 miles per hour (mph) in areas of suitable habitat identified by the USFWS, BLM, and UDWR.

   Effectiveness: This conservation measure would minimize impacts to Utah prairie dogs that that could be encountered during construction along the 250-foot-wide transmission line ROW by ensuring construction and maintenance vehicles travel at speeds likely to reduce the possibility of collisions with individual Utah prairie dogs.

Direct and Indirect Effects

Impacts to the Utah prairie dog would result in disturbance to potentially suitable habitat located within Low- and High-Intensity-Survey Areas. The proposed Project would result in the construction and operation disturbance of 574 acres (0.4 percent) and 110 acres (<0.1 percent), respectively, of potentially suitable habitat in the analysis area.

Impacts to Utah prairie dogs could result from increased habitat fragmentation, noxious weed invasion, and human activity and noise, both during construction and maintenance activities of the transmission line and access roads. Impacts also could include increased predation by raptors which may perch on transmission structures located near the West Lund Complex. Access roads may occur in proximity to the West Lund Complex or in unoccupied Utah prairie dog habitat. Vehicle travel and noise associated with these access roads could impact Utah prairie dogs by altering movement and dispersal by individuals living in nearby colonies.

It is not anticipated that construction activities would permanently restrict colonization of the 250-foot-wide transmission line ROW by Utah prairie dogs. In fact, habitat disturbance could encourage future colonization, based on the availability of soft, permeable soils that would occur along the ROW subsequent to the Project construction. However, prairie dogs may avoid overhead structures due to the potential increase in avian predators. Impacts would primarily be the result of habitat loss and fragmentation. Remaining impacts to the Utah prairie dog would be limited to temporary habitat disturbance. This disturbance is anticipated to have little impact given the extent of native habitats in the surrounding Project region.

The USFWS and UDWR have identified potential reintroduction sites for future relocations of Utah prairie dogs in western Utah. The USFWS has reviewed all relocation sites for potential impacts resulting from construction and operation of the project and has made a determination that no impacts are anticipated under the current preferred alternative (USFWS 2015).

Impacts would be more pronounced in areas located in proximity to mapped Utah prairie dog habitat. However, the West Lund Complex has experienced very low population counts since 2008 (**Table 6-1**). The colonies range from 0.43 mile (colony 0121g) to 1.83 miles (colony 0121a) from the edge of the analysis area. Implementation of the above design features, general conservation measures, and Utah prairie dog-specific conservation measures would reduce potential Project-related impacts to prairie dog colonies associated with the West Lund Complex, historic colonies, and potentially suitable habitat.

After considering design features and conservation measures, remaining Project construction and operation impacts to the Utah prairie dog would be limited to habitat loss; habitat fragmentation; and disturbance during construction and routine maintenance activities. This disturbance is anticipated to have little impact on the species, given the lack of occupied habitat within the potential areas of disturbance and the extent of available native habitats in the surrounding Project region.

Cumulative Effects

No reasonably foreseeable non-federal future actions have been identified within the vicinity of the proposed Project action area for the Utah prairie dog.

Monitoring

There are currently no known short- or long-term monitoring and reporting plans for Utah prairie dog in the Project analysis area.

Determination

Effect on the Species: The Proposed Action *may affect, but is not likely to adversely affect* the Utah prairie dog as a result of the proposed Project construction and operation.

Effect on Critical Habitat: Critical habitat has not been designated for the Utah prairie dog. Consequently, implementation of the Proposed Action would have no effect on critical habitat for this species.

Rationale: Construction and operation activities would not directly affect the Utah prairie dog. No occupied Utah prairie dog colonies were identified during 2013 and 2014 surveys conducted within the Utah prairie dog analysis area. In addition, the nearest occupied Utah prairie dog habitat is located at the West Lund Complex, which comprise colonies 0121a, 0121c, 0121e, and 0121g. These colonies are located between 0.43 mile (colony 0121g) and 1.83 miles (colony 0121a) from the edge of the analysis area. Therefore, construction and operation of the proposed Project would not likely adversely affect the Utah prairie dog due to the absence of the species from the analysis area and the distance of existing colonies from the proposed Project and low population numbers at existing sites. Preconstruction surveys of the project ROW would identify any new colonies that have been established since protocol level surveys were conducted in 2013 and 2014. In the event that newly established colonies are observed within the project ROW, TransWest would be required to avoid and minimize any potential impacts through micro-sitting and implementation of mitigation measure SSWS-7.

6.1.2 Birds

6.1.2.1 California Condor (Endangered, EXP/NE)

Environmental Baseline

Conservation Status

The California condor was designated as endangered on March 11, 1967 (FR 32:4001) and later listed under the ESA upon its conception in 1973. Despite protection, populations continued to decline, and by 1982 only 22 wild condors remained (Arizona Game and Fish Department [AGFD] 2012; Peregrine Fund 2008). A special provision of the ESA, the 10(j) rule, allows for the designation of non-essential populations (EXP/NE) of listed species (AGFD 2008), and re-introduction efforts for the condor were

developed under this rule. This listing covers only those populations within the U.S. and excludes the non-essential populations (NEPs) in specific portions of Arizona, Nevada, and Utah (61 FR 54043-54060). Current re-introduced condor populations are considered 10(j) populations, except where they occur within National Parks where they receive protection under the ESA endangered status.

In March 2009, a 5-Year Review of the status of the California condor was initiated. Designated critical habitat does not occur within the California condor analysis area. The current recovery plan for the species was issued in April 1996 (Third Revision).

During the late Pleistocene Era which ended 10,000 years ago, the range of the California condor extended across much of North America, with records from Oregon, California, Nevada, New Mexico, Texas, Florida, New York, and Mexico (Emslie 1987; Steadman and Miller 1987). By the time of the arrival of explorers in North America, California condors occurred only in a narrow Pacific coastal strip from British Columbia, Canada to Baja California Norte, Mexico (Wilbur 1978). California condors were observed in the northern portion of the Pacific Coast region, as far north as the Columbia River Gorge, until the mid-1800s and as far south as northern Baja California until the early 1930s (USFWS 2013b). By about 1950, California condors were confined to a wishbone-shaped area encompassing six counties just north of Los Angeles, California. In the 1984 California Condor Recovery Plan, this area was designated by the California Condor Recovery Team as the range of primary concern. It has been used by management agencies and the public for planning purposes.

Conservation measures, focused primarily on habitat preservation, began in the 1930s. However, the wild population of California condors continued to decline. Population estimates suggest that there were 50 to 60 California condors in 1968, 25 to 35 in 1978, and 25 to 30 in 1980. A captive breeding program began in 1982 using eggs and chicks removed from the wild and a single captured adult condor, leaving an estimated 21 individuals in the wild. In the winter of 1984–1985, a population crash claimed 6 condors (40 percent of the wild population at that time), leaving only a single breeding pair in the wild. In 1986 and 1987, all nine remaining adult and juvenile wild birds were captured in order to ensure their safety and preserve the species' genetic diversity. From that point, 27 birds (as well as 13 wild eggs and 4 chicks) would form the foundation of the captive breeding program (USFWS 1996a).

California condors were extinct in the wild until 1992 when the first eight birds raised in captivity were released in southern California. The reintroduction of birds continued in Arizona in 1996, central coastal California in 1997, northern Baja California, Mexico, in 2002, and Pinnacles National Monument, California, in 2003 (USFWS 1996a). Population growth has been steady over the last two decades, and in late 2008 the wild California condor population exceeded the captive population for the first time since 1983. As of November 30, 2013, there were 123 wild condors in California, 75 in Arizona, and 29 in Baja, California, for a total of 227 wild condors (Peregrine Fund 2013). The current range of the condor population in Arizona is centered on the Colorado River Basin in northern Arizona and southern Utah. This population occurs outside the California condor analysis area; however, condors regularly forage, roost, and might nest in southern Utah. Condors commonly occur in Utah between April and November, but peak numbers usually occur from June through August. Condors can travel up to 200 miles in 1 day (UDWR 2011). Therefore, individuals could occur within the California condor analysis area (UDWR 2005).

On September 24, 1976, the USFWS published a final rule in the FR (Vol. 41, No. 187, September 24, 1976) designating nine critical habitat areas for the California Condor including Blue Ridge, Tulare County Rangelands, Kern County Rangelands, Tejon Ranch, Mt. Pinos, Sespe-Piru, Matilija, Sisquoc-San Rafael, and Hi-Mountain-Beartrap East and West. No critical habitat is present within the California condor analysis area.

Life History and Habitat Association

California condors have an expansive home range and are capable of travelling from 50 to over 100 miles in a single day. Condors require open habitat for soaring and easily locating feeding

opportunities. Condors do not build nests; rather, they move sand, branches, rocks, and other materials around in nest sites to produce an appropriate substrate needed for egg laying (USFWS 2013b). Breeding habitat is typically located in steep remote mountainous or canyon terrain on rock or cliff escarpments at low to moderate elevation.

Condor habitat must support large mammals, which they consume as carrion. Foraging habitats differ from nesting habitat and consist of open foothill grasslands and oak savanna foothills that support populations of deer, elk, and cattle. Condors require large foraging areas because feeding opportunities are limited and often widely distributed across their range. Roosts, found in or near both foraging and nesting habitat areas typically consist of large trees or snags with open lateral branches or cliff faces and rock spires with available perches. Because they are such large birds, they typically select roosting sites near cliffs where updrafts provide adequate lift for them to take flight (AGFD 2012; American Ornithologists' Union (AOU) 2004; Snyder and Rea 1998; USFWS 1996b).

Courtship and nest site selection by breeding California condors occurs from December into spring. Female condors typically lay a single egg between late January and early April. The egg is incubated by both parents and hatches after approximately 56 days. Both parents share responsibilities for feeding the chick. Feeding usually occurs daily for the first 2 months and tapers off thereafter. Condor chicks leave the nest at 2 to 3 months of age, but remain in the vicinity of the nest where they are fed by their parents. Chicks begin to fly at 6 to 7 months of age, but do not become fully independent from their parents until the following year. Parent birds occasionally continue to feed a fledgling even after it has begun to make longer flights to foraging grounds. California condors may lay a replacement clutch if their first (Harrison and Kiff 1980) or even second egg is lost (Snyder and Hamber 1985). California condors typically do not nest until they are at least six years old and it is a long lived species, living up to 50 years (USFWS 1996b).

California condors are opportunistic scavengers that only feed on carrion. Condors are social feeders with typical foraging behavior consisting of long-distance reconnaissance flights, circle-soaring over a carcass, and hours of waiting at roosts or on the ground near a carcass (USFWS 1996b). Condors do not use their sense of smell to locate food but instead rely on sight and the presence of other scavengers such as eagles and ravens to indicate the presence of food. Prior to Euro-American settlement of North America, condors inhabiting interior California likely fed on mule deer, elk, pronghorn, and smaller mammals. Condors have been observed feeding on 24 different mammal species in the last two centuries and 95 percent of the diet consisted of cattle, domestic sheep, ground squirrels, mule deer, and horses. Over half of these observations were of condors feeding on cattle carcasses, mostly calves (USFWS 2013b). There also is some evidence that suggests California condors prefer deer over cattle. As part of the California condor release program, California condors also are provided supplemental food in the form of stillborn calves (USFWS 1996a).

Threats

There is some uncertainty as to the primary mortality factors that caused the overall California condor population decline. However, there is evidence that human-caused lead poisoning and hunting have contributed disproportionately to the decline of the species in recent years (USFWS 1996a). Eggshell thinning caused by the pesticide DDT may have been a serious cause of decline in the 1950s and 1960s. Recent studies also indicate that breeding California condors sometimes ingest small man-made materials (microtrash) and feed these items to their nestlings. Recorded microtrash ingested by condors includes nuts, bolts, washers, copper wire, plastic, bottle caps, glass, and spent ammunition cartridges. The ingestion of these items by nestlings can cause digestive problems and result in death. Of the known causes of mortality in wild nestlings, 8 of 18 (44 percent) have been as a result of mircrotrash ingestion (USFWS 2013b). Other factors formerly contributing to the decline of the species include egg and specimen collecting, capture of live birds for sport or display, Native American ceremonial use, and drowning in uncovered oil sumps. These activities are no longer believed to represent threats to California condors.

Snyder and Schmitt (2002) reported that lead poisoning is likely the most important cause of the recent decline of California condors, and may have accounted for much of the historic decline. However, Sorenson et al. (2009) reported that in California, power lines are currently the number one known cause of death with lead poisoning a close second. As of 2005, 6 percent of California condors that have been released into the wild since 1992 were killed by electrocution (APLIC 2006), and deaths from power line collisions also have occurred. However, the USFWS and other California Condor Recovery Program partners participating in captive condor rearing have developed powerline aversion training on condors before releasing them in to the wild. New wild born condor fledgling without such training are the most vulnerable to collision with powerlines.

Currently, sufficient remaining habitat exists in California and in southwestern states to support a large number of condors, if density-independent mortality factors including shooting, lead poisoning, microtrash ingestion, and collisions with human-made objects, can be controlled. The possibility of eventual genetic disorders resulting from the species' propagation from a perilously low population size cannot be discounted (USFWS 2013b).

Recovery

The current Recovery Plan for the species was issued in April 1996 (Third Revision) and a 5-Year Review of the status of the California condor was published in June, 2013. The Recovery Priority in the third revision to the Recovery Plan for the California Condor (Recovery Plan) in 1996 was 1C, which indicates a monotypic genus that faces a high degree of threat and has a stable or increasing population and a high potential for recovery. At the start of the most recent 5-year review (USFWS 2013b), the Recovery Priority Number for the California condor was designated as 4C. As defined in the Endangered and Threatened Species Listing and Recovery Priority Guidelines, the Recovery Priority Number is based on a 1 to 18 ranking system where 1 is the highest rank and 18 the lowest (48 FR 4309, as corrected in 48 FR 51985). The existing 4C designation indicates that the California condor is a monotypic genus that faces a high degree of threat and has a low potential for recovery. The “C” indicates conflict with construction, development projects, or other forms of economic activity.

The strategy of the USFWS recovery program (USFWS 1996a) was to: 1) increase reproduction in captivity to provide condors for the release program, 2) release condors into the wild, 3) minimize condor mortality factors, 4) maintain habitat for condor recovery, and 5) implement condor information and education programs. The primary objective of the Recovery Plan is reclassification of California condor from endangered to threatened status (USFWS 1996a).

The Recovery Plan for the California Condor (USFWS 1996a) does not specify criteria for removing the species from the List of Endangered and Threatened Wildlife. At that time, there were too few condors in existence to anticipate all the actions that would be necessary to bring about full recovery. The Recovery Plan does outline one minimum criterion, along with five conditions that need to be achieved before reclassifying the species to a threatened status. The minimum criterion is the maintenance of at least two non-captive (wild) populations and one captive population. The five conditions that must be met, in addition to the minimum criterion, are that these populations:

1. Must each number at least 150 individuals;
2. Must each contain at least 15 breeding pairs; and
3. Must be reproductively self-sustaining with a positive rate of population growth.

Furthermore, the non-captive (wild) populations

4. Must be spatially disjunct and non-interacting; and
5. Must contain individuals descended from each of the 14 founders.

Assessment of Effects

Area of Analysis

In Utah, the condor population is considered as EXP/NE south of I-70 and east of I-15, except within National Parks. Any condors occurring outside of the experimental population area, including those on National Park lands and in southeastern Nevada, are listed as endangered under the ESA. In Utah, the Project action area lies entirely east of and outside of the 10(j) boundary (**Figure 6-3**), thus any impacts to California condor in Utah would be to federally listed endangered individuals. In southern Nevada, the Halfway Wash East ground electrode bed and most of its associated transmission line, lie to the east of I-15 and are therefore within the 10(j) boundary. Any impacts to California condor associated with the ground electrode bed facility would therefore be to EXP/NE individuals. The transmission line action area crosses I-15 into the 10(j) area approximately 50 miles northeast of Las Vegas and back out of the 10(j) boundary on the southern end of the line south of Boulder City. The California condor analysis area is defined as potential foraging habitat (all land cover types within the range of the California condor) within the Project action area as defined in Section 2.2. These areas represent 497,229 acres of potential California condor foraging habitat and are depicted in **Figure 6-3**.

Condors regularly forage, roost, and may even nest in southern Utah (Sutter et al. 2005). The current range of this population is centered on the Colorado River Basin in northern Arizona and southern Utah. Although condors often winter in Arizona, many condors from the southwestern population forage over Utah. They can travel back and forth between the Grand Canyon and Zion National Park in a single day. Condors commonly occur in Utah between April and November, but peak numbers usually occur from June through August. Based on their ability to travel up to 200 miles in 1 day (UDWR 2011), this species could occur anywhere within the California condor analysis area.

Conservation Measures

Impacts to the California condor would be minimized through implementation of the following design features and conservation measures described in Chapter 3.0:

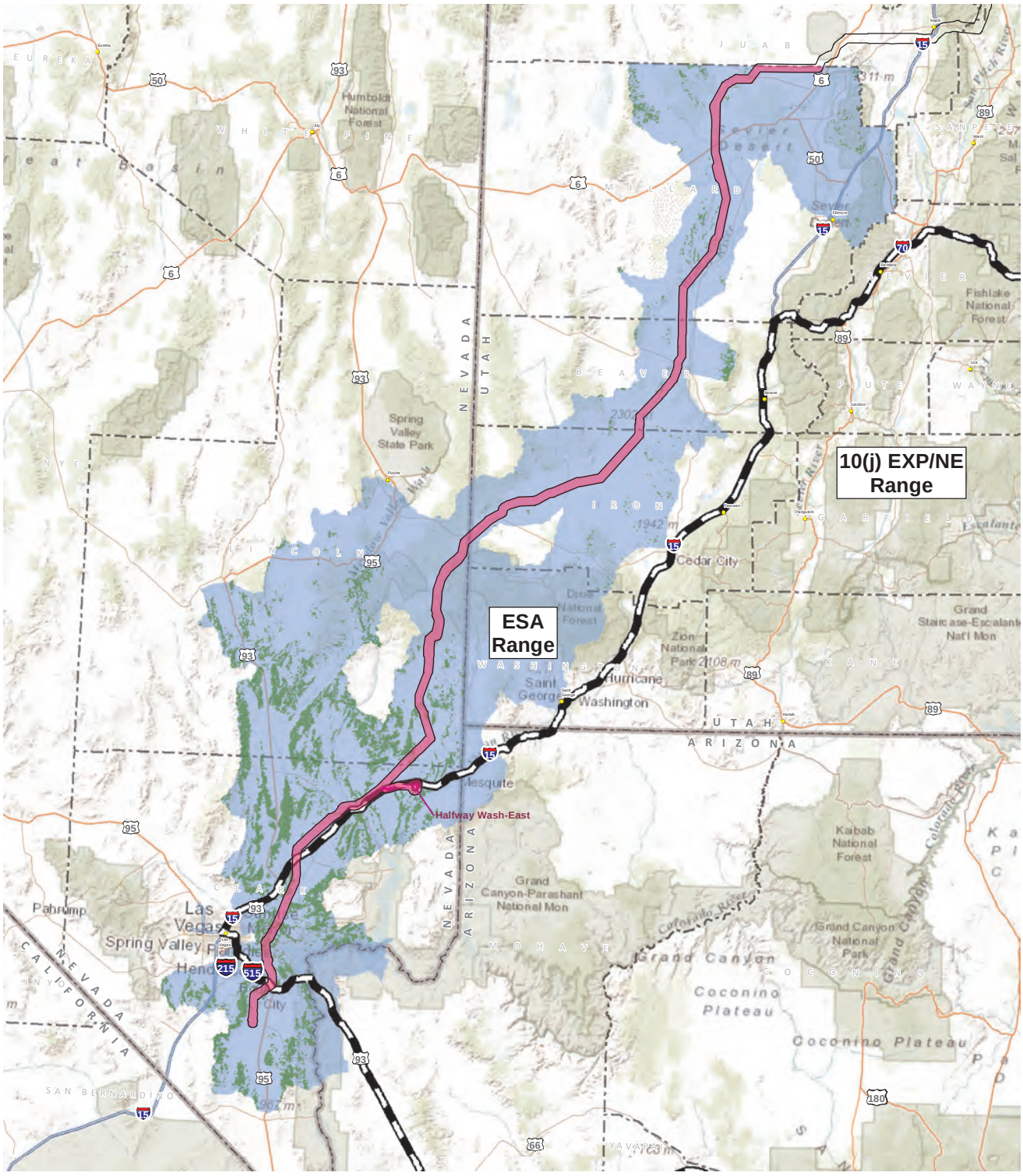
- Applicant-committed mitigation measures and design features: TWE-1 – TWE-5, TWE-26, TWE-27, TWE-29, TWE-30, TWE-31, TWE-32, TWE-33, TWE-34, TWE-45, TWE-60, and TWE-61.
- Conservation measures: **SSWS-15**, **WLF-2,** and **WLF-8**.

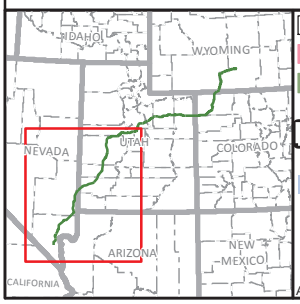
Direct and Indirect Effects

Since 1995 there have been a total of seven transmission line-related California condor deaths in California and Arizona (Ventana Wildlife Society [VWS] 2007). In response, the USFWS and other California Condor Recovery Program partners participating in captive condor rearing have developed powerline aversion training, which is provided to condors before they are released into the wild. New wild-born condor fledglings without such training are the most vulnerable to collision with powerlines. California condors normally produce only a single egg every other year (AGFD 2012). Because they have a low reproductive rate, populations can be impacted by even sporadic mortality (USFWS 1996a).

Direct Project-related impacts to the California condor would primarily result from the transmission line presenting a collision hazard during the operation phase of the project (AGFD 2012; Snyder and Rea 1998; Terres 1980; USFWS 1996a). Due to the wide spacing of conductors and ground wires (40 to 50 feet), the transmission line itself would pose negligible potential for electrocution of condors. Because condors wingspans can reach 9.5 feet, the electrode line connecting the Halfway Wash East electrode bed to the Project, which has a conductor spacing of approximately 6 feet, has potential to result in condor electrocutions. However, these lines are expected to be energized at high currents for less than

K:\Projects_4\TransWestExpress\12907_003_Transwest_Express\Figures\DocumentFigures\2015_BA_v2\SSWildlifeFig_6_03_CaliforniaCondor.mxd





- Action Area
- Analysis Area
- California Condor Potential Nesting Habitat
- 10(j) Experimental/Non-Essential Range and ESA Range Boundary
- Foraging Habitat Within the Project Area
- Potential Ground Electrode Siting Area
- Potential Ground Electrode Overhead Electrical Line

Action Area Buffer for Analysis Area: None

TRANSWEST EXPRESS TRANSMISSION PROJECT

Figure 6-3
Area of Analysis for California Condor

0 10 20 40 Miles
0 10 20 40 km
1:2,500,000

N

Western AREA POWER ADMINISTRATION

Exported On: 4/2/2015

30 hours per year, or less than 0.4 percent of a year. The combination of the fact that condor observations in Nevada are considered rare and the limited time that the Halfway Wash East electrode bed would be energized reduces the potential electrocution risk for condors from the Halfway Wash East electrode line. Consequently, the probability of a condor coming into contact with the Halfway Wash East electrode line while it is energized is so small as to be discountable. The Southern Terminal is not expected to pose an electrocution hazard to condors because it would be fenced and no large animals would be able to access the area and provide a source of carrion that would attract condors to the site.

Because the species has such a large foraging range, the proposed Project would result in the construction and operation disturbance of 4,254 acres (0.9 percent) and 830 acres (0.2 percent), respectively, of potentially suitable habitat in the analysis area. Condors are cavity-nesting birds and most nest sites have been found in caves, on rock ledges, or in tree cavities. Direct impacts to condor nesting habitat from construction activities are unlikely because the species nests in rugged, remote locations. Although **Figure 6-3** depicts some limited nesting habitat within the Analysis Area, this is due to the coarseness of land cover datasets incorporated in the condor habitat model. There are no suitable cliffs for roosting or nesting currently known to occur within the Analysis Area.

Implementation of TransWest's applicable design features (e.g., TWE-30) and conservation measure WLF-8 listed above would avoid or minimize operation-related impacts to the California condor. Remaining impacts to the California condor would be limited to temporary disturbance of potential foraging habitat during construction. This disturbance is anticipated to have negligible impact given the linear nature of the Project and extent of native habitats in the surrounding Project region.

Cumulative Effects

No reasonably foreseeable non-federal future actions have been identified within the vicinity of the proposed Project action area for the California condor.

Monitoring

Condors are subject to intensive long-term monitoring by entities such as The Peregrine Fund that are involved in the species' recovery program. No additional long-term monitoring requirements have been identified for the Proposed Action.

Determination

Effect on the Species: The Proposed Action *may affect, but is not likely to adversely affect* the federally listed population of this species as a result of the Project construction and operation. The Proposed Action *is not likely to jeopardize* EXP/NE individuals on the east side of the 10(j) boundary in southern Nevada.

Effect on Critical Habitat: The Proposed Action would have *no effect* on California condor critical habitat.

Rationale: Operation of the transmission line could pose a collision hazard to foraging California condors, especially wild-born condors that have not been exposed to powerline aversion training. APLIC guidelines would be implemented to avoid and minimize potential collision and electrocution risk to this species. Given the large-diameter/high visibility of the proposed conductors and their wide spacing, the probability of condors colliding with or being electrocuted by the transmission line is so small as to be discountable. Due to its infrequency of use at high voltages, the probability for electrocution of condors by the Halfway Wash East electrode line is considered insignificant and discountable.

6.1.2.2 Southwestern Willow Flycatcher (Endangered)

Environmental Baseline

Conservation Status

The southwestern willow flycatcher was listed as endangered, without designated critical habitat, on February 27, 1995 (60 FR 10693-10715). Critical habitat was later designated on July 22, 1997 (62 FR 39129-39147). A court decision in 2001 resulted in a subsequent Final Rule on Critical Habitat on October 19, 2005 (70 FR 60885-61009). Critical habitat for the southwestern willow flycatcher was revised in 2013 (201378 FR 343 534). In total, approximately 1,227 stream miles have been designated as critical habitat, with a lateral extent including riparian areas and streams that occur within the 100-year flood plain or flood-prone areas totaling 208,973 acres. A 5-year review of the subspecies was completed by the USFWS in 2005 (73 FR 14995-14997).

The southwestern willow flycatcher breeds in dense riparian habitats in southwestern North America. The historic breeding range of this species includes southern California (from the Santa Ynez River south); Arizona; New Mexico; southwestern Colorado; extreme southern portion of Nevada and Utah, western Texas, and the possibly extreme northern Baja California, Sonora, and Chihuaha in Mexico. The flycatcher's current range is similar to the historical range, but the quantity of suitable habitat is much reduced from historical levels (USFWS 2002a). All species of willow flycatcher breed in North America, but winter in Mexico, Central America, and northern South America (Sogge et al. 1997).

Throughout the range of the southwestern willow flycatcher, important riparian habitat is rare, widely separated, and small and/or linear locales. Marshall (2000) found that 53 percent of southwestern willow flycatchers were located in just 10 sites (breeding groups) range-wide, while the other 47 percent were distributed among 99 small sites of ten or fewer territories. This species has experienced extensive loss of habitat and also is endangered by other factors, including brood parasitism by the brown-headed cowbird (USFWS 1995b). Unitt (1987) reviewed historical and contemporary records of the southwestern willow flycatcher throughout its range, determining that it had ''declined precipitously,'' and that ''although the data reveal no trend in the past few years, the population is clearly much smaller now than 50 years ago, and no change in the factors responsible for the decline seem likely.''

When the southwestern willow flycatcher was listed as endangered in 1995, approximately 350 territories were known to exist (Sogge et al. 2001). As of the 2001 breeding season, the minimum known number of southwestern willow flycatchers was 986 territories. Though much suitable habitat remains to be surveyed, the rate of discovery of new nesting pairs has recently leveled off (Sogge et al. 2001). A coarse estimate is that an additional 200 to 300 nesting pairs may remain undiscovered, yielding an estimated total population of 1,200 to 1,300 pairs/territories. Unitt (1987) estimated that the total flycatcher population may be 500 to 1,000 pairs; thus, nearly a decade of intense survey efforts have found little more than slightly above the upper end of Unitt's estimate. The surveys of the 1990s have been valuable in developing a range-wide population estimate, but cannot identify a range-wide trend over that period.

Critical habitat for the southwestern willow flycatcher was recently revised in 2013 (201378 FR 343 534). In total, approximately 1,227 stream miles have been designated as critical habitat, with a lateral extent including riparian areas and streams that occur within the 100-year flood plain or flood-prone areas totaling 208,973 acres. There is no designated critical habitat within the southwestern willow flycatcher analysis area.

Life History and Habitat Association

The southwestern willow flycatcher is restricted to riparian habitats along rivers, streams, or wetlands (Hiatt and Boone 2003). Four specific types of breeding habitats have been described for the southwestern willow flycatcher. The first is comprised of dense stands of willows 10 to 23 feet in height, with no distinct overstory. This community is often associated with sedges, rushes, or other herbaceous

wetland plants. A second habitat type includes nearly monotypic, dense stands of salt cedar or Russian olive up to 33 feet in height. These species form a dense, closed canopy, with no distinct understory layer. Native broadleaf-dominated communities composed of a single species (often a willow species) or mixtures of native broadleaf trees and shrubs (cottonwood, willows, boxelder, ask, alder) form a third habitat type. The final habitat type is a mixture of native and exotic riparian species (Sogge et al. 1997).

Regardless of the vegetation species composition, all of these habitats share common structural characteristics. Occupied southwestern willow flycatcher habitats always have dense vegetation in the interior, and dense areas are often interspersed with small clearings, open water, or areas of sparse shrubs. Habitat patches can vary in size and shape, with some occupied areas being relatively dense, linear, contiguous stands, and others being large, irregularly shaped mosaics of dense vegetation intermingled with open areas. Habitat patch sizes can range from as little as 2 acres to several hundred or a thousand acres. Southwestern willow flycatchers can occur at elevations as high as 7,875 feet amsl. They also inhabit willow or cottonwood riparian areas that extend out into desert regions (Terres 1980). Migration and winter habitat could differ from breeding habitat for this subspecies. During migration, riparian habitat along major southwestern drainages is commonly utilized, but a close association with water may not always exist. These drainages might be considered stopover areas, and could be very important migration habitat for the southwestern willow flycatcher (USFWS 2002a).

Southwestern willow flycatchers are usually monogamous in their breeding habitats; however, rates of polygyny may vary between 10 and 20 percent. Males generally arrive at breeding areas approximately 1 or 2 weeks before the female and nest building usually begins a week thereafter. Nests are constructed as open cup nests approximately 8 centimeters (cm) high and 8 cm wide, which are typically placed in the fork of a branch. Egg-laying can begin as early as late May, but typically occurs in early to mid-June. Clutch size is usually 3 or 4 eggs for initial nests. Incubation last between 12 and 13 days from the date the last egg is laid, and eggs typically hatch within 24 to 48 hours of each other. Chicks can be present in the nest mid-June through early August and fledging typically ensues from late June through mid-August. Adults then depart from breeding areas between mid-August to mid-September (Sogge et al. 1997).

The breeding season diet of southern willow flycatchers is exclusively insectivorous. Flycatchers forage on a wide range of prey taxa ranging in size; however, diet can vary between years and among different habitat types. Foraging is done primarily by sallying from a perch to perform aerial hawking and gleaning. Foraging frequently takes place at edges and opening with a habitat patch, or at the top of the upper canopy (Sogge et al. 2010).

Threats

The most significant indirect threats to the southwestern willow flycatcher include extensive loss, fragmentation, and modification of riparian breeding habitat, (Sogge et al.1997), with consequent reductions in population levels (USFWS 2002). Destruction and modification of riparian habitats have been caused mainly by reduction of surface and groundwater due to diversion and groundwater pumping, changes in flood and fire regimes due to dams and stream channelization, clearing and controlling vegetation, livestock grazing, changes in water and soil chemistry due to disrupted hydrologic cycles, and establishment of invasive plant (USFWS 2002a). This species also is affected directly by factors that impact their survival and reproductive success, such as brood parasitism by brown-headed cowbirds, which further reduce population levels.

Recovery

On March 5, 2003, a Final Recovery Plan for the southwestern willow flycatcher was issued (68 FR 10485). Habitat and breeding site characteristics, potential threats, management responsibilities and status, and recovery options vary widely among breeding sites across the species range. Thus, six RUs, further subdivided into Management Units, were designated based on watershed and hydrologic units within the breeding range of the flycatcher. This allows for a strategy to characterize populations,

structure recovery goals, and facilitate effective recovery actions that should closely resemble realities on the ground (USFWS 2002a).

The overall recovery objective for the flycatcher is to increase the population level and attain an amount and distribution of habitat sufficient to provide for the long-term persistence of metapopulations, despite local extirpations. This would require ameliorating the threats that led to listing the flycatcher as an endangered species. The specific objectives, outlined in the 2013 Recovery Plan include:

- Recovery to the point that reclassification to "threatened" is warranted.
- Recovery to the point that delisting is warranted.

Reclassification from endangered to threatened could be considered when either of the following criterion have been met:

- Criterion A: Increase the total known population to a minimum of 1,950 territories (equating to approximately 3,900 individuals), geographically distributed to allow proper functioning as metapopulations, so that the flycatcher is no longer in danger of extinction. For reclassification to threatened status, these prescribed numbers and distributions must be reached as a minimum, and maintained over a 5-year period.
- Criterion B: Increase the total known population to a minimum of 1,500 territories (equating to approximately 3,000 individuals), geographically distributed among Management Units and RUs, so that the flycatcher is no longer in danger of extinction. For reclassification to threatened status, these prescribed numbers and distributions must be reached as a minimum, and maintained over a 3-year period, and the habitats supporting these flycatchers must be protected from threats and loss.

The southwestern willow flycatcher could be removed from the list of threatened and endangered species when both of the following criteria have been met:

- Criterion 1. Meet and maintain, at a minimum, the population levels and geographic distribution specified under reclassification to threatened Criterion A; increase the total known population to a minimum of 1,950 territories (equating to approximately 3,900 individuals), geographically distributed to allow proper functioning as metapopulations.
- Criterion 2. Provide protection from threats and create/secure sufficient habitat to ensure maintenance of these populations and/or habitats over time. The sites containing flycatcher breeding groups, in sufficient number and distribution to warrant downlisting, must be protected into the foreseeable future through development and implementation of conservation management agreements (e.g., public land management planning process for federal lands, habitat conservation plans (under Section 10 of the ESA), conservation easements, and land acquisition agreements for private lands, and intergovernmental conservation agreements with Tribes). Prior to delisting, the USFWS must confirm that the agreements have been created and executed in such a way as to achieve their role in flycatcher recovery, and individual agreements for all areas within all Management Units (public, private, and Tribal) that are critical to metapopulation stability (including suitable, unoccupied habitat) must have demonstrated their effectiveness for a period of at least 5 years.

Date of Recovery

- Reclassification to threatened could be initiated in 2020, or sooner.
- Delisting could be accomplished within 10 years of reclassification.

Assessment of Effects

Area of Analysis

The southwestern willow flycatcher analysis area is defined as potential habitat (riparian and woody riparian and wetlands vegetation communities) within the action area plus a 0.5-mile buffer centered on the 250-foot-wide ROW. The Project's action area is defined in Section 2.2. This analysis area represents 1,910 acres of potential southwestern willow flycatcher habitat and is depicted in **Figure 6-4**.

Along the Project action area in Utah, Iron County is within the range of the southwestern willow flycatcher. In Nevada, this species is known to occur in Lincoln and Clark counties and has potential to occur where the action area traverses Meadow Valley Wash (Segment 1540.1) and Muddy River, (Segment 1540.2). Downstream of the action area, essential habitat for southwestern willow flycatcher has been identified along the Muddy River in the Overton State Wildlife Area (78 FR 343). There are records of occurrence for southwestern willow flycatcher in Las Vegas Wash (Segment 1660), but no confirmed breeding in this area.

In the vicinity of the action area, critical habitat has been designated along the Virgin River in Clark County, Nevada. This area of critical habitat extends upstream along the Virgin River from the upper end of Lake Mead to Berry Springs in Washington County, Utah (78 FR 343) (**Figure 6-4**). The total length of critical habitat along the Virgin River is 94 miles (78 FR 343).

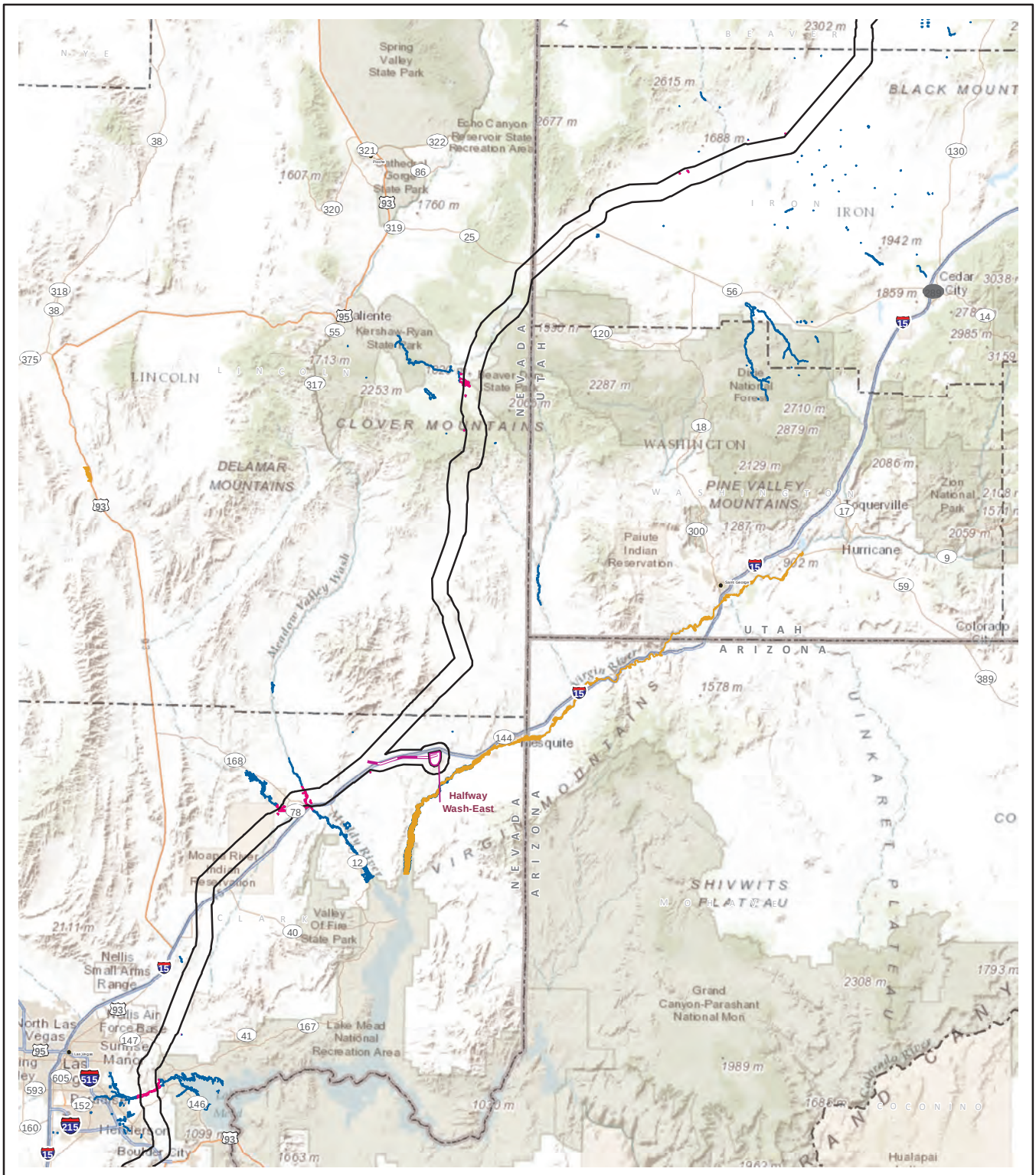
Conservation Measures

Impacts to the southwestern willow flycatcher and its habitat would be minimized through implementation of the following design features and conservation measures described in Chapter 3.0:

- Applicant-committed conservation measures and design features: TWE–8, TWE–24, TWE–25, TWE–26, TWE–29, TWE-31, TWE-32, TWE–33, and TWE–34.
- Conservation measures: **SSWS–15**, **WLF–1**, **WLF–4**, **WLF–5**, **WLF-6**, **WLF-7**, **WLF–8,** and **WLF-10**.

The following additional conservation measure is proposed to avoid or reduce effects of the Proposed Action on the southwestern willow flycatcher.

- **SSWS-8**: To prevent impacts to the southwestern willow flycatcher, TransWest would implement the following measures:
    1. All surface disturbing activities would be restricted within a 0.25-mile buffer from suitable riparian habitats and permanent surface disturbances would be avoided within 0.5 mile of suitable southwestern willow flycatcher habitat.
        - Unavoidable ground disturbing activities in occupied southwestern willow flycatcher habitat would only be conducted when preceded by current year USFWS-protocol level survey, would only occur between August 16 and April 30 (the period when southwestern willow flycatcher are not likely to be breeding), and would be monitored to ensure that adverse impacts to southwestern willow flycatcher and suitable habitat are minimized or avoided, and to document the success of project-specific mitigation/protection measures. As monitoring is relatively undefined, project specific requirements must be identified.
    2. Native species would be preferred over non-native for revegetation of habitat in disturbed areas.



Action Area Buffer for Analysis Area: 0.5 Mile

TRANSWEST EXPRESS TRANSMISSION PROJECT

Figure 6-4
Area of Analysis for
Southwestern Willow Flycatcher

0 5 10 20 Miles
0 5 10 20 km
1:1,250,000

N

Western AREA POWER ADMINISTRATION

Exported On: 3/27/2015

K:\Projects_4\TransWestExpress\12907_003_Transwest_Express\Figures\DocumentFigures\2015_BA_v2\SSWildlife\Fig_6_04_SWFL.mxd

3. Habitat disturbances would be avoided within 0.25 mile of occupied Southwestern willow flycatcher habitat from May 1 to August 15.

Effectiveness: This conservation measure would result in the avoidance or minimization of impacts to the southwestern willow flycatcher and its habitat.

Direct and Indirect Effects

Potential direct impacts to southwestern willow flycatcher would include the construction and operation disturbance of potentially suitable breeding, roosting, and foraging habitat. Impacts could result from the loss or alteration of suitable woody riparian and wetland habitats, reduction in forage base, and increased human disturbance. Impacts to the southwestern willow flycatcher could occur as a result of the construction and operation disturbance of 6.9 acres (0.4 percent) and 1.6 acres (<0.1 percent), respectively, of potentially suitable southwestern willow flycatcher habitat within the analysis area.

Construction has potential to disrupt native and non-native vegetation used by southwestern willow flycatchers, but this disruption would be temporary and it is anticipated that additional, better quality vegetation would be established once reclamation is complete. It is likely that areas where vegetation is removed would contain primarily introduced species, and native vegetation would be removed only on an incidental basis.

Improved access as a result of Project roads could further fragment suitable habitat and result in increased disturbance to the species. Impacts would be more pronounced if construction were to occur during the southwestern willow flycatcher breeding season (March 15 to October 15). Operation of the proposed Project would incrementally increase the collision potential for southwestern willow flycatchers.

Implementation of the design features and general conservation measures along with SSWS-8 listed above would essentially eliminate the potential for Project-related impacts to southwestern willow flycatcher. Moreover, potentially suitable habitat in portions of the analysis area in which this species is most likely to occur including Meadow Valley Wash, Muddy River, and Las Vegas Wash, can easily be spanned by the transmission line as evidenced by existing transmission lines in these areas with which the Proposed Action would be co-located.

It also should be noted that TransWest has developed an operational policy and a comprehensive strategy for avoiding, minimizing, and monitoring impacts to birds during construction and operation of the Proposed Action. This policy/strategy has been incorporated into a single, over-arching document, an Avian Protection Plan (APP), which is included in Appendix B of the TWE POD (Appendix D of the Final EIS). The APP outlines principles of avian protection, potential avian interactions with the transmission line facilities, construction design standards, training and monitoring requirements, nest management, and adaptive management in accordance with the APP Guidelines developed by the USFWS and APLIC in 2005 (APLIC 2012). Adherence to the TWE APP would further ensure that potential impacts to southwestern willow flycatcher are avoided or minimized.

Cumulative Effects

No reasonably foreseeable non-federal future actions have been identified within the vicinity of the proposed Project action area for the southwestern willow flycatcher.

Remaining impacts to southwestern willow flycatchers would be limited to temporary disturbance of potential foraging habitat. This disturbance is anticipated to have little impact given the linear nature of the proposed Project and the extent of foraging habitat in the surrounding Project region.

There are currently no known short- or long-term monitoring and reporting plans for southwestern willow flycatcher in the Project analysis area.

Monitoring

There are currently no species-specific monitoring requirements for southwestern willow flycatchers within the area of analysis. However, general monitoring of avian interactions along the Proposed Action would occur with implementation of TransWest's APP described above.

Determination

Effect on the Species: The Proposed Action *may affect, but is not likely to adversely affect* the southwestern willow flycatcher.

Effect on Critical Habitat: The Proposed Action would have *no effect* on southwestern willow flycatcher critical habitat.

*Rationale: Riparian habitats most likely to support southwestern willow flycatchers can easily be spanned by the proposed transmission line. In addition, direct and indirect impacts to this species and its habitat would be avoided through implementation of the design features and general conservation measures listed above (and described in Chapter 3.0) and the species-specific conservation measure (**SSWS-8**) described above. Designated critical habitat for the southwestern willow flycatcher would not be affected by the Proposed Action as there is no critical habitat within the action area.*

6.1.2.3 Yuma Clapper Rail (Endangered)

Environmental Baseline

Conservation Status

The Yuma clapper rail was listed as an endangered species on March 11, 1967 under the Endangered Species Preservation Act of 1966 (32 FR 4001). Only the U.S. population is designated as endangered under the ESA. No critical habitat has been designated for this subspecies. The Yuma Clapper Rail Recovery Plan was issued in 1983 (USFWS 1983a). A draft Revised Recovery Plan was issued on February 10, 2010 (USFWS 2010a). There have been no revisions to the listing. A downlisting package was prepared for the FR in 1983 (USFWS 1983b); however, flooding of important clapper rail habitat on the lower Colorado River in that year resulted in the proposal not being published. Instability of population numbers after 1983 precluded reconsideration of the proposal (USFWS 2010a).

The historical distribution of the Yuma clapper rail is not clear. The species might have benefited from human activities that create habitat (backwaters with sedimentation and emergent vegetation), such as the construction of dams on the Colorado River and some of its tributaries. This creation of habitat could have contributed to the expansion of the Yuma clapper rails' historic range. The present distribution of the Yuma clapper rail is similar to the historic distribution, except for some possible range expansions northward along the Colorado River into Lake Mead and the Virgin River. The Yuma clapper rail currently occurs along the lower Colorado River and tributaries (Virgin River, Bill Williams River, lower Gila River) in Arizona, California, Nevada, and Utah; the Salton Sea in California; and the Cienega de Santa Clara and Colorado River Delta in Mexico (USFWS 2010a). There is approximately 10,551 acres of Yuma clapper rail habitat in the U.S. compared to 18,532 acres in Mexico (USFWS 2010a).

Accurate population size estimates have been difficult to obtain due to differences in survey timing, varying surveyor experience, and completeness of the survey efforts. Surveys conducted in 1973, 1974, and 1981 in the U.S. yielded Yuma clapper rail counts of 702, 821, and 787, respectively (USFWS 1983b). Then, in the most recent 5-year review of the Yuma clapper rail (USFWS 2006a) the USFWS indicated that the species status is stable based on survey data from 1998 to 2002, which showed Yuma clapper rail numbers remaining in the range of 500 to 600 birds. More recent surveys discussed in the 2010 draft recovery plan indicated that during the 2000 to 2008 timeframe, the minimum number of Yuma clapper rails in the U.S. has fluctuated between 503 and 890 individuals, and has reached the minimum recovery population 6 of 700 in 5 of those 9 years.

No critical habitat is proposed or designated for the Yuma clapper rail.

Life History and Habitat Association

The Yuma clapper rail is unique among clapper rails in that it is the only rail that occupies freshwater marshes during the breeding seasons yet primarily winters in brackish marshes south of the U.S. (Anderson and Ohmart 1985). The Yuma clapper rail breeds and forages in freshwater marshes with dense emergent vegetation along the Colorado River. Ideal habitat components include a mosaic of emergent vegetation typically greater than 6 feet in height, shallow (less than 12 inches) open water areas as channels or pools with minimal daily water fluctuation, open dry ground between water, vegetation or marsh edge, and a strip of riparian vegetation along the edges of the marsh for that provide cover and buffer areas that could be used seasonally (USFWS 2010a). Some populations of Yuma clapper rails are thought to be non-migratory, remaining near their breeding grounds through the winter where they occupy tall, dense bulrush/cattail stands. They also utilize flooded salt cedar and willow stands (Rosenberg et al. 1991). Yuma clapper rails were originally thought to migrate to Mexico because they were not detected on their breeding grounds in the U.S. during the winter months. It is possible that they were not detected during the winter because wintering populations are almost completely silent (Rosenberg et al. 1991).

Yuma clapper rail home range size and habitat selection varies seasonally. Home ranges are typically smallest during the breeding season (March through July) at 17 to 20 acres and largest in the post breeding season (August through October) at 37 acres and during late winter (January through February) at 59 acres. Males and females tend to have similar home range sizes (USFWS 2010a). Although Yuma clapper rails can inhabit a wide range of marsh sizes, their success is dependent on the mosaic of habitat features summarized above. Large blocks of suitable habitat are essential in providing more opportunities to maintain this mosaic (USFWS 2010a).

Yuma clapper rails breed from March through July, after breeding territories have been established. They are highly territorial during breeding season, with both sexes defending territory. Nests are constructed on a platform of vegetation raised 3 to 6 inches above the ground and concealed in dense marsh vegetation. Incubation begins after the last egg is laid (rails lay one per day), and lasts approximately 21 to 23 days. All eggs hatch within a 24-hour period (AGFD 2006). Clutch size can vary widely from 5 to 15 eggs, but typically consists of 8 to 10 eggs (Patten 2005). Most eggs hatch during the first week of June. Precocial young begin following adults through the marsh within 48 hours of hatching. Family groups of clapper rails typically stay together for approximately 24 to 30 days after hatching. Young clapper rails begin flying 63 to 70 days post hatching (AGFD 2006).

Yuma clapper rails forage while walking on substrates such as mud flats, sandbars, recumbent stems of marsh plants, and between stems of marsh plants (AGFD 2006). The Yuma clapper rail feeds primarily on crayfish, but also forages on small fish, tadpoles, clams, and other aquatic invertebrates (Patten 2005; USFWS 2010a). Crayfish are an introduced species to the Lower Colorado River Basin and their introduction could have been pivotal to the range expansion of the Yuma clapper rail, as crayfish provided a more abundant and secure food supply (USFWS 2010a). Seasonal variability of crayfish is correlated with shifts in habitat use by clapper rails. During periods of low prey availability, daily foraging movements of Yuma clapper rails tend to be over a larger area (USFWS 2010a). Rosenberg et al. (1991) have suggested that crayfish abundance might be a limiting factor in determining Yuma clapper rail occurrence today.

Threats

At the time the Yuma clapper rail was listed as endangered in 1967, threats to the species included loss of habitat due to river channelization and changes in flows due to managed water deliveries. Agricultural and municipal water diversions from the Lower Colorado River nearly eliminated freshwater flow to the Delta, degrading Yuma clapper rail habitat. Currently, existing habitats are primarily either human-made, as are the managed ponds at Salton Sea or the effluent-supported marshes at the Cienega de Santa

Clara, or formed behind dams and diversions on the Lower Colorado River at the time those structures were created. All habitat is subject to natural successional processes that reduce habitat value for clapper rails over time unless natural or human induced restorative events (e.g., fires, scouring floods) occur. The greatest threat to the Yuma clapper rail is that without active management and protection of water sources supporting the habitat, these habitat areas will be permanently lost. Other threats to this species include continuing land use changes in floodplains, disturbance from human activities, environmental contaminants (particularly increases in selenium levels), and reductions in connectivity between core habitat areas (USFWS 2010a, 2006a).

Recovery

A draft Revised Recovery Plan for the Yuma clapper rail was issued on February 10, 2010 (USFWS 2010a). The species' Recovery Priority Number is 6, which indicates a subspecies with a high degree of threat and low recovery potential from loss of habitat due to lack of natural river processes that create and maintain marshes, lack of security relative to the protection of existing habitat, a low chance of recovery because of habitat losses in the U.S., and the lack of protection for clapper rail habitat in Mexico (USFWS 2010a).

To achieve recovery, the Yuma clapper rail must reach and maintain a viable population level and have sufficient protected and managed marsh habitat to provide for long-term persistence of populations in the three major core areas (Lower Colorado River, Salton Sea, and Cienega de Santa Clara) and movement corridors between them. The focus of the USFWS recovery strategy is providing long-term management and protection for a sufficient amount of core and other habitats to support a viable population of Yuma clapper rails, monitoring of populations and habitats, research to provide effective conservation and recovery, and application of research results and monitoring through adaptive management. The ultimate recovery goals are to achieve population stability and habitat protection sufficient to downlist and/or delist the Yuma clapper rail. A summary of recovery objectives and recovery criteria (USFWS 2010a) are provided below.

1. Documentation of a stable or increasing trend for numbers of rails in the U.S. as shown through annual rail surveys based on maintaining a statistically secure minimum population size determined by research and modeling (as exemplified in Fleischer et al. 1995).
2. Protection of sufficient breeding and wintering habitat to support the desired minimum population size from identified threats and allow for connectivity of habitat.
3. Development of management plans for all important federal and state-owned habitat areas in the U.S. and for the Cienega de Santa Clara in Mexico that provide for habitat development, maintenance of suitable habitat conditions, and protection from human disturbances.
4. Completion of an assessment of the degree of threat from existing and predicted selenium levels to adult rails and recruitment of young rails and, if necessary, implementation of management actions to control this threat in rail habitats.
5. Evaluation of potential migration pathways between the Lower Colorado River, Salton Sea, and Mexican core habitat areas that provide for connectivity that supports population viability and, if appropriate, development of management plans to protect stop-over habitats.
6. Completion of efforts to protect and secure for the long-term an adequate water supply to support rail habitat at current levels at the Salton Sea and in the Cienega de Santa Clara.

The Yuma clapper rail will be considered for <u>downlisting</u> when the following criteria are met:

1. Annual rail surveys document a stable or increasing trend in population based on a minimum of 824 rails in the U.S. for at least 5 consecutive years.
2. Management plans for all important federal and state-owned habitat areas are developed. For the Lower Colorado River, these areas are: Havasu National Wildlife Refuge (NWR), Bill

Williams NWR, Cibola NWR, Imperial NWR, Mittry Lake State Wildlife Area, Imperial Division Lands of the Bureau of Land Management; for the Salton Sea: Sonny Bono Salton Sea NWR and Imperial State Wildlife Area.

3. Long-term contracts providing for a quality and quantity of water to support the Yuma clapper rail habitats at the Salton Sea are in place. The amount and quality of the water supply should be sufficient to maintain healthy cattail marsh habitat at Sonny Bono Salton Sea NWR and Imperial State Wildlife Area.

The Yuma clapper rail will be considered for delisting when the downlisting criteria and the following additional criteria have been met.

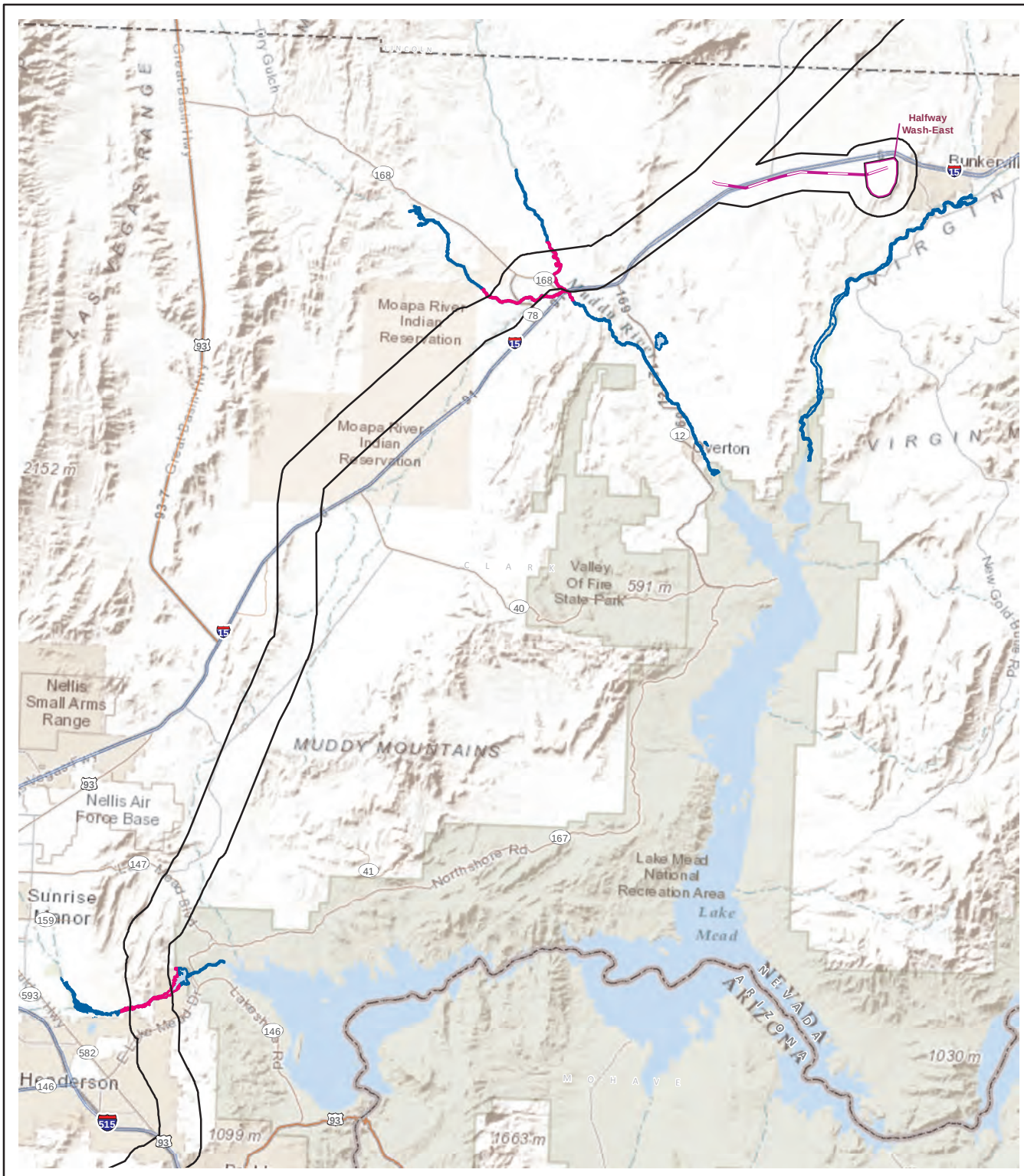
1. Annual rail surveys document a stable or increasing trend in population based on a desired population of 824 individuals (or a higher minimum population size established through research and modeling) in the U.S. for at least 5 years beyond that needed for downlisting.
2. The amount of habitat needed to support a minimum population size (as determined in #4 above) is established, protected, and managed to ensure adequate breeding and wintering habitat in the U.S.
3. An assessment of the degree of threat from existing and predicted selenium levels to adult rails and recruitment of young rails is completed, and, if necessary, management actions to control this threat in rail habitats are implemented.
4. An evaluation is completed of potential migration pathways between the Lower Colorado River, Salton Sea, and Mexican core habitat areas that provide for connectivity that supports population viability and, if appropriate, management plans are developed to protect stopover habitats.
5. A water supply of sufficient quality to ensure the continuation of current levels of rail habitat, in terms of both quantity and quality has been secured for the long-term for the Cienega de Santa Clara. This water supply can be of the current quantity (approximately 100,000 acre-feet per year), and quality (averaging less than 2,660 parts per million [ppm]) or that needed to maintain salinities in the Cienega below that needed for cattail growth [5,000-6,000 ppm]) over the long term.

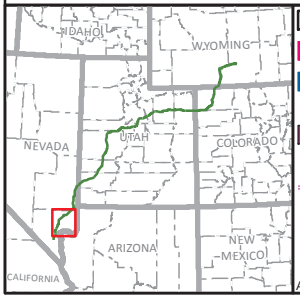
Assessment of Effects

Area of Analysis

The Yuma clapper rail was formerly restricted to an area near Yuma, Arizona, but has since expanded its range. Over 70 percent of the breeding population winters along the lower Colorado River (Rosenberg et al. 1991). In the vicinity of the action area, the subspecies has potential to occur along the Muddy and Virgin Rivers and the Las Vegas Wash (GBBO 2010).

The Yuma clapper rail analysis area is defined as potential habitat (herbaceous wetlands) within the Project action area and 0.5 mile buffer in Clark County, Nevada. These areas represent 1,213 acres of potential Yuma clapper rail habitat and are depicted in **Figure 6-5**.





- Action Area
- Analysis Area
- Yuma Clapper Rail Potential Habitat
- Ground Electrode Siting Area
- Ground Electrode Overhead Electrical Line

Action Area Buffer for Analysis Area: 0.5 Mile

TRANSWEST EXPRESS TRANSMISSION PROJECT

Figure 6-5
Area of Analysis for
Yuma Clapper Rail

0 2.5 5 10 Miles
0 2.5 5 10 km
1:500,000

N

Western AREA POWER ADMINISTRATION

Exported On: 4/2/2015

K:\Projects_4\TransWestExpress\12907_003_Transwest_Express\Figures\DocumentFigures\2015_BA_v2\SSWildlifeFig_6_05_YumaClapperRail.mxd

Conservation Measures

Impacts to the Yuma clapper rail and its habitat along the proposed Project alignment would be minimized through implementation of the following design features and general conservation measures described in Chapter 3.0:

- Applicant-committed conservation measures and design features: TWE-8, TWE-24, TWE-25, TWE-29, TWE-31, TWE-32, TWE-33, and TWE-34.
- Conservation measures: **SSWS-15, WET-1. WET-2, WET-3, WLF-1**, **WLF-4**, **WLF-5**, **WLF-6**, **WLF-7**, **WLF-8,** and **WLF-10**.

No species-specific conservation measures have been identified for the Yuma clapper rail.

Direct and Indirect Effects

Within the area of analysis, the Yuma clapper rail could occur within suitable marsh habitat along the Muddy River and Las Vegas Wash.

Potential direct impacts to Yuma clapper rail include the construction and operation disturbance of potentially suitable breeding, roosting, and foraging habitat. Impacts could result from the loss or alteration of suitable herbaceous wetland habitat, reduction in forage base, and increased human disturbance, particularly during the breeding season. If construction of the proposed Project was to occur during Yuma clapper rail breeding season (approximately March 15 to October 15), impacts to breeding rails could include the loss of nests or nest abandonment caused by increased noise and human activity in proximity to an active nest site.

The Proposed Action could result in the construction and operation disturbance of up to 5.3 acres (0.4% percent) and 1.2 acres (<0.1 percent), respectively, of potentially suitable Yuma clapper rail habitat. These acreages are a conservative estimate of potential habitat impacts and are based on general assumptions about the amount of project impacts per unit length of the transmission line, regardless of habitat. In reality, impacts to Yuma clapper rail habitat are expected to be avoided. As evidenced by existing, co-located transmission lines, the portions of the analysis area in which this species is most likely to occur, i.e., along the Muddy River and Las Vegas Wash, can be easily spanned by the Project.

Implementation of the Applicant-committed measures and design features and the additional conservation measures listed above would essentially eliminate the potential for this species to be adversely affected by the project during construction. Although operation of the proposed Project would incrementally increase the collision potential for Yuma clapper rails, the probability of collision is low due to this species' preference for walking or running rather than flying. To the extent that this species is non-migratory within the analysis area, the probability of collision is further reduced.

As noted above, TransWest has developed a plan for avoiding, minimizing, and monitoring impacts to birds during construction and operation of the Proposed Action. This plan has been incorporated into a single, over-arching document, an APP, which is included in Appendix B of the TWE POD (Appendix D of the Final EIS). The APP outlines principles of avian protection, potential avian interactions with the transmission line facilities, construction design standards, training and monitoring requirements, nest management, and adaptive management in accordance with the APP Guidelines developed by the USFWS and APLIC in 2005 (APLIC 2012). Adherence to the TWE APP would further ensure that potential impacts to the Yuma clapper rail are avoided or minimized.

Cumulative Effects

No reasonably foreseeable non-federal future actions have been identified within the vicinity of the analysis area for the Yuma clapper rail.

Monitoring

There are currently no species-specific monitoring requirements for Yuma clapper rails within the area of analysis. However, general monitoring of avian interactions along the Proposed Action would occur with implementation of TransWest's APP described above.

Determination

Effect on the Species: Construction and operation of the proposed Project *may affect, but is not likely to adversely affect* the Yuma clapper rail.

Effect on Critical Habitat: Critical habitat has not been designated for the Yuma clapper rail; thus, the Proposed Action would have *no effect* on critical habitat for this species.

Rationale: Herbaceous wetland habitats within the Yuma clapper rail area of analysis can easily be spanned by the Proposed Action. As a result, there would be no direct impacts to potential habitat for this species. Indirect impacts to this species could occur as a result of human activity and noise during construction. Such impacts could temporarily displace Yuma clapper rail from the analysis area but would not be expected to rise to the level of take. Implementation of the Applicant-committed measures and design features and conservation measures listed above would further ensure that Project-related disturbance to Yuma clapper rail habitat is avoided or minimized.

6.1.2.4 Western Yellow-billed Cuckoo (Threatened)

Environmental Baseline

Conservation Status

In 1998 the USFWS received a petition to list the yellow-billed cuckoo under the ESA stating that the species is endangered in a significant portion of its range and that this range is coterminous with a valid subspecies, the western yellow-billed cuckoo (*Coccyzus americanus occidentalis*). In 2000, a 90-day petition was announced (65 FR 8104) concluding that further scientific or commercial information was required to determine the taxonomic validity of a western subspecies, and to determine if listing the western population as a DPS was warranted. Then, in 2001, the USFWS published a 12-month petition finding (66 FR 38611) concluding that the western yellow-billed cuckoo constituted a valid DPS and that the DPS was warranted for listing; however, this action was precluded by higher priority listing action, and the DPS was placed on the candidate species list. The Western U.S. DPS of the yellow-billed was proposed for listing as threatened on October 3, 2013 (78 FR 61622). On November 3, 2014, the species was listed as threatened by the USFWS (79 FR 59992).

Critical habitat for the western yellow-billed cuckoo was proposed by the USFWS on August 15, 2014 (79 FR 48548). On November 12, 2014 the USFWS extended the public comment period on proposed critical habitat in nine states including Wyoming, Colorado, Utah, and Nevada (79 FR 67154).

Life History and Habitat Association

Based on historic accounts, the western yellow-billed cuckoo was once widespread and locally common in California and Arizona, locally common in a few river reaches in New Mexico, locally common in portions of Oregon and Washington, generally local and uncommon in scattered drainages of arid and semiarid portions of western Colorado, western Wyoming, Idaho, Nevada, and Utah (USFWS 2013k).

Over the past 90 years, the species' range has contracted and the northern limit of breeding along the west coast in now in the Sacramento Valley with a small potentially breeding population in coastal

northern California (USFWS 2013k). The western subspecies has been nearly extirpated and is restricted to small isolated populations (Bennett and Keinath 2003). The current geographical breeding range of the western yellow-billed cuckoo in North America includes suitable habitat within the low- to moderate-elevation areas west of the crest of the Rocky Mountains in Canada and the U.S. including the upper and middle Rio Grande, the Colorado River Basin, the Sacramento and San Joaquin River systems, the Columbia River system, and the Fraser River. In Mexico the range includes the Cape Region of Baja California Sur, and river systems in the Mexican States of Sonora, Sinaloa, western Chihuahua, and northwestern Durango (USFWS 2013k).

Yellow-billed cuckoo populations in western North America have declined dramatically from their former numbers, primarily because of the loss or degradation of high-quality riparian habitat. Yellow-billed cuckoos are now considered very rare in Utah, Colorado, Nevada, and Wyoming with few if any observations reported annually. Total current population size for the western subspecies in the U.S. is estimated to be 475 to 675 pairs with a similar number likely in Mexico (Bennett and Keinath 2003).

Accurate population trends are difficult to estimate because quantitative data, including historical population estimates, are generally lacking. Cuckoos are no longer found in British Columbia, Washington, or Oregon. Idaho, Montana, Utah, Wyoming, and Nevada report occasional scattered observations and remaining populations in California, Arizona, New Mexico, and Texas are vastly reduced (Bennet and Keinath 2003).

WYNDD ranked the historical trend for yellow-billed cuckoos as a “large decline” (a decrease of over 50 percent since 185) based on near extirpation of the species in the West. In addition, WYNDD ranked the recent trend as a “moderate decline” (a decrease of less than 50 percent since 1950) since most declines in abundance occurred prior to 1950 (Bennett and Keinath 2003). Although the Western Slope of Colorado probably never supported many cuckoos, the birds have now become extremely rare. The *Colorado Breeding Bird Atlas* states that the status of western yellow-billed cuckoos in Colorado mimics the rest of the continent, in that they are nearly extirpated (Kingery 1998). According to the *Atlas of Breeding Birds of Nevada*; yellow-billed cuckoos are declining and are now rare in both Nevada and Utah (Floyd et al. 2007).

The Rocky Mountains geographically separate the two subspecies of yellow-billed cuckoo. The western (*Coccyzus americanus occidentalis*) and eastern (*Coccyzus americanus americanus)* subspecies exemplify the significant ecological differences between these areas. The western yellow-billed cuckoo depends on old-growth riparian woodlands with dense understories whereas the eastern subspecies is associated with more open woodlands with thick undergrowth (Kingery 1998). In the arid West, yellow-billed cuckoos are riparian specialists (Floyd et al. 2007). Cuckoos typically inhabit large stands of mature, dense willows, but they also use smaller patches of mesquite, tamarisk, hackberry, and other wood vegetation (Floyd et al. 2007). Cuckoos typically do not utilize conifer and mixed broad/leaf/conifer forests and/or urban areas (Bennet and Keinath 2003).

The western yellow-billed cuckoo is a long-distance, complete Neotropical migrant and generally one of the last migrants to arrive on breeding grounds in the U.S., arriving in late May, and peaking in June (Hughes 1999). Cuckoos depart for wintering grounds beginning in late August to mid-September. The migratory route of the western yellow-billed cuckoo is not well known because few specimens collected on wintering grounds have been ascribed to the western or eastern subspecies (Bennett and Keinath 2003). The western yellow-billed cuckoo likely moves down the Pacific Slope of Mexico and Central America to northwestern South America.

Western yellow-billed cuckoos appear to require large areas of riparian woodland for nesting. Nesting home ranges vary from 25 acres to over 100 acres. Nesting densities range from 1 to 27 pairs per 99 acres, depending on local conditions (USFWS 2001). In the western U.S., nests are typically constructed in willows, Fremont cottonwood, mesquite, hackberry, soapberry, alder, or cultivated fruit trees on horizontal branches or vertical forks of the large tree or shrub (Hughes 1999). Nests are

generally placed between 1 and 6 meters (3 and 20 feet) above the ground and hidden by foliage (Hughes 1999). Nest sites in arid regions are restricted to relatively humid river bottoms, ponds, swampy areas, and damp thickets (Hughes 1999). Both members of the pair build a well-concealed nest of twigs in dense foliage that is usually within 10 m of the ground.

The western yellow-billed cuckoo has a short breeding season, lasting only about 4 months from time of arrival on breeding grounds in the spring to fall migration. Western yellow-billed cuckoos typically lay a single clutch per season of 2 or 3 eggs in mid-June to mid-July, and incubation occurs over 9 to 11 days (Hughes 1999; Johnson et al. 2008). However, two or even three clutches in a season can occur. Cuckoos are a monogamous species and incubation is shared equally between males and females and both parents brood and tend young (Hughes 1999). Development of the young is very rapid, with fledgling occurring in 6 to 9 days; the entire breeding cycle may be only 17 days from egg laying to fledging of the young (Hughes 1999). Fledglings are dependent upon parents for up to 3 weeks following fledgling (Johnson et al. 2008). The western yellow-billed cuckoo is infrequently parasitized by the brown-headed cowbird, possibly because its short breeding period reduces the chance of successful nest parasitism (Hughes 1999).

The primary food items consumed by cuckoos include large insects such as caterpillars, cicadas, and grasshoppers (Hughes 1999). They also will occasionally prey on small lizards, frogs, and eggs or young of other birds. Additionally, cuckoos will are known to small fruits and seeds on wintering grounds and occasionally during the breeding season (Bennett and Keinath 2003). Cuckoos hunt prey via a sit-and-wait strategy whereby they perch inconspicuously and scan the surrounding vegetation for moving prey. Cuckoos also glean insects from vegetation while perched or hovering, and will occasionally hawk insects, similar to a flycatcher. Cuckoos also will actively pursue grasshoppers, frogs, and lizards on the ground or in vegetation (Hughes 1999).

Threats

Habitat loss is the primary threat to the western yellow-billed cuckoo (Corman and Wise-Gervais 2005; Floyd et al. 2007). Western yellow-billed cuckoos appear to require large tracts of contiguous habitat (UDWR 2005) and population declines across the western U.S. are primarily due to the loss of cottonwood-dominated riparian habitat. This loss is primarily a result of conversion to agriculture, dams and river flow management, bank protection, overgrazing, and competition from exotic plants such as tamarisk (Bennett and Keinath 2003). Western yellow-billed cuckoos are further threatened by their low population size, extreme population fluctuations, and patchy distribution (Bennett and Keinath 2003). Heavy pesticide usage during the last 50 years also has likely contributed to population declines by removing prey, directly poisoning birds, and causing egg shell thinning (Bennet and Keinath 2003).

Under the ESA and USFWS policy, the USFWS determines whether a species (or a distinct population segment of a vertebrate species) is a threatened species based on any of the following five factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence. Of these five factors, the USFWS has determined that western yellow-billed cuckoo is threatened with (A) the threatened destruction, modification, or curtailment of its habitat and range and (E) other natural or manmade factors affecting its continued existence (A and E) (USFWS 2013k).

Factor A: Threats to yellow-billed cuckoo include habitat destruction, modification and degradation from dam construction operations; water diversions; riverflow management; stream channelization and stabilization; conversion to agricultural uses, such as crops and livestock grazing; urban and transportation infrastructure; and increased wildfires. These factors also contribute to habitat fragmentation, loss of habitat, and spread of non-native plant species, especially tamarisk (USFWS 2013k).

Factor E: Due to the rarity of yellow-billed cuckoo habitat and because populations tend to be small and isolated: the remaining populations in western North America are increasingly susceptible to further declines through lack of immigration, chance weather events, fluctuating availability of prey populations, pesticides, collisions with tall vertical structures during migration, spread of the introduced tamarisk leaf beetle as a biocontrol agent in the Southwest, and climate change (USFWS 2013k).

Recovery

A recovery plan has not yet been prepared for the western yellow-billed cuckoo; however, numerous conservation efforts that are aimed at recovery of the western yellow-billed cuckoo are underway. In Nevada, Arizona, and other southwestern states, conservation plans are in various stages of implementation that would result actions covering thousands of acres of riparian habitat that could benefit the western yellow-billed cuckoo. These included, but are not limited to, the Lower Colorado River Multi-Species Conservation Program, various State Wildlife Action Plans, the Virgin River Habitat Conservation and Recovery Program, Muddy River Recovery Implementation Program, and Las Vegas Wash Comprehensive Adaptive Management Plan (USFWS 2013k).

Assessment of Effects

Area of Analysis

The western yellow-billed cuckoo analysis area is defined as potential habitat (woody riparian and wetlands) within the action area plus a 0.5-mile buffer. These areas represent 18,146 acres of potential western yellow-billed cuckoo habitat and are depicted on **Figures 6-6** and **6-7**.

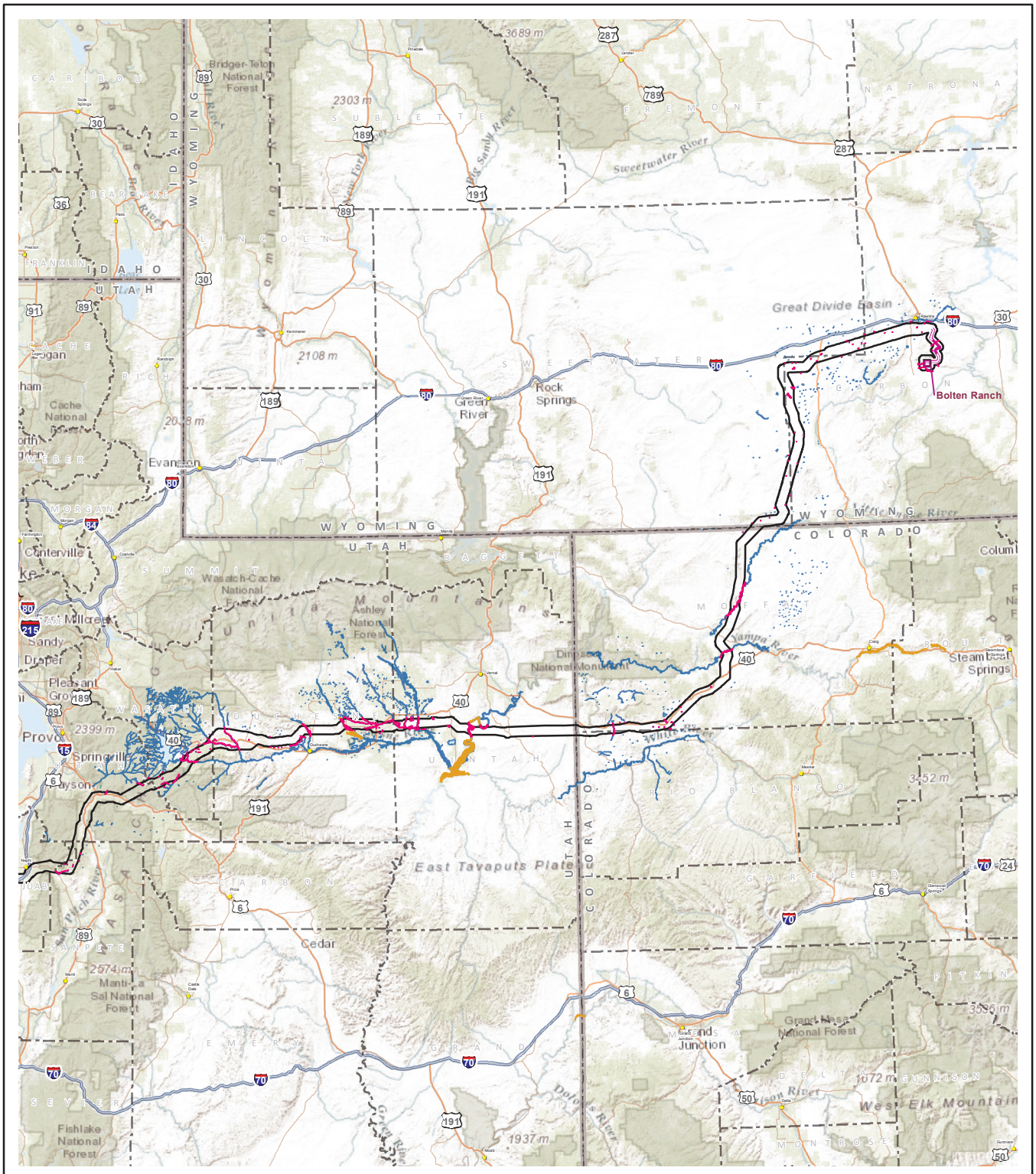
The range of the western population of yellow-billed cuckoo has been determined as the portion of yellow-billed cuckoo range west of the crest of the Rocky Mountains (USFWS 2001). Currently the western yellow-billed cuckoo is very rare in scattered drainages in western Wyoming, Colorado, Idaho, Nevada, and Utah (NatureServe 2012). Western yellow-billed cuckoos are extremely rare summer residents in western Wyoming and Colorado. The majority of potentially suitable habitat in the northern portion of the action area occurs along the Little Snake River and Yampa River (Project Segment 1187) in Moffat County, Colorado (**Figure 6-6**) and along the Green, Uinta, Lake Fork, and Duchesne Rivers in Uintah and Duchesne Counties, Utah. The species has been documented within 5 miles of the analysis area in Uintah, Duchesne, Utah and Wasatch counties, Utah (UNHP 2010, USFWS 2015b). In Nevada the species has been documented in or near the action area along the Muddy River (Project Segment 1540.2) (Floyd et al. 2007), in Meadow Valley Wash (Segment 1540.1), and along Las Vegas Wash (Segment 1660) (GBBO 2010) (**Figure 6-7**).

In Utah, proposed critical habitat is present where the action area traverses the Green River in Uintah County, and Lake Fork River in Duchesne County. In Nevada, proposed critical habitat is located along the Muddy River in Clark County, approximately 6 miles upstream (in the Moapa Valley National Wildlife Refuge) of the action area and as well as approximately 15 miles downstream of the action area.

Conservation Measures

Impacts to the western yellow-billed cuckoo and its habitat along the proposed Project route would be minimized through implementation of the following design features and conservation measures as described in Chapter 3.0:

- Applicant-committed conservation measures and design features: TWE-8, TWE-24, TWE-25, TWE-26, TWE-29, TWE-31, TWE-32, TWE-33, and TWE-34.
- Conservation measures: **WLF-1**, **WLF-4**, **WLF-5**, **WLF-6**, **WLF-7**, **WLF-8**, **WLF-10,** and **SSWS-15**.



Action Area
Analysis Area
Western Yellow-billed Cuckoo Potential Habitat
Proposed Critical Habitat
Ground Electrode Siting Area
Ground Electrode Overhead Electrical Line

Action Area Buffer for Analysis Area: 0.5 Mile

TRANSWEST EXPRESS TRANSMISSION PROJECT

Figure 6-6
Region I and II
Area of Analysis for
Western Yellow-billed Cuckoo

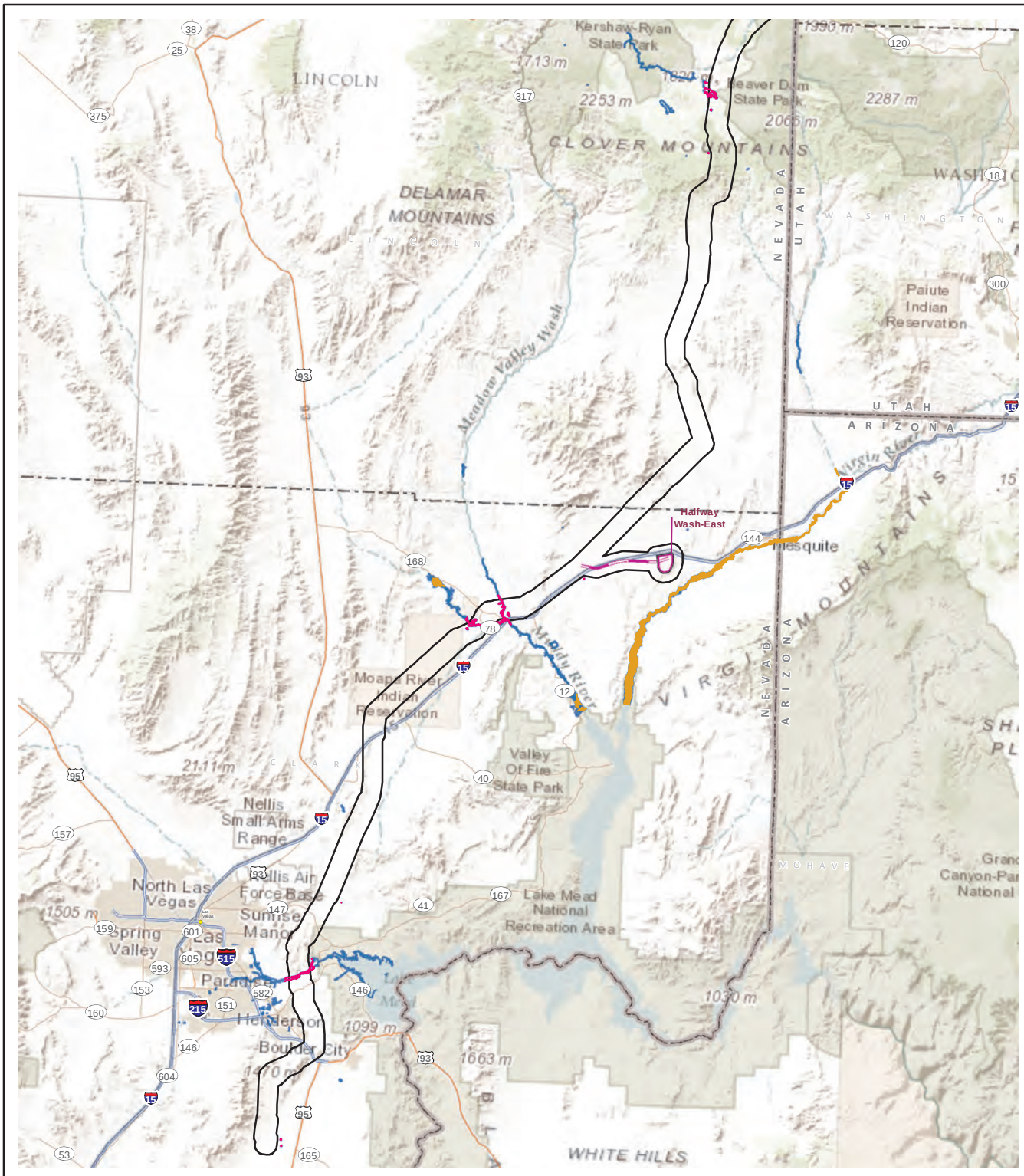
0 10 20 40 Miles
0 10 20 40 km
1:2,500,000

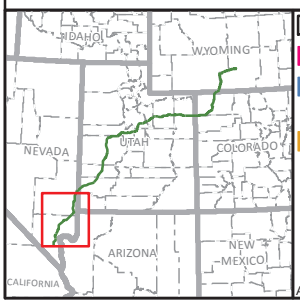
N

Western Area Power Administration

Exported On: 4/8/2015

K:\Projects_4\TransWestExpress\12907_003_Transwest_Express\Figures\DocumentFigures\2015_BA_v2\SWildlife\Fig_6_06_WYBC_Map01.mxd





- Action Area
- Analysis Area
- Western Yellow-billed Cuckoo Potential Habitat
- Potential Critical Habitat
- Ground Electrode Siting Area
- Ground Electrode Overhead Electrical Line

Action Area Buffer for Analysis Area: 0.5 Mile

TRANSWEST EXPRESS TRANSMISSION PROJECT

Figure 6-7
Region III and IV
Area of Analysis for
Western Yellow-billed Cuckoo

0 5 10 20 Miles
0 5 10 20 km
1:1,000,000

N

Western AREA POWER ADMINISTRATION

Exported On: 3/27/2015

K:\Projects_4\TransWestExpress\12907_003_Transwest_Express\Figures\DocumentFigures\2015_BA_v2\SSWildlifeFig_6_07_WYBC_Map02.mxd

The following additional conservation measure is proposed to avoid or reduce effects of the Proposed Action on the western yellow-billed cuckoo.

SSWS-6: To prevent impacts to the western yellow–billed cuckoo during the breeding season, TransWest would avoid all pre-construction, construction, operations, maintenance, decommissioning, vegetation clearing, spraying, and other surface–disturbing activities within 0.25 mile of suitable habitat from May 1 to September 15. Prior to construction, field surveys would be conducted within the refined transmission corridor to confirm all areas of suitable habitat. If avoidance is not possible, the following mitigation measures would apply:

- Breeding season surveys would be completed in suitable habitat for western yellow-billed cuckoo within the analysis area in accordance with established protocols. If western yellow-billed cuckoos are documented within this area, additional avoidance and minimization measures would be identified and implemented in coordination with the BLM, Western, USFWS, and applicable state wildlife agencies.
- If an active western yellow-billed cuckoo nest is identified during surveys, it would be avoided by a minimum of 500 feet, and Project activities would ensure that sufficient habitat within a minimum 50-acre habitat patch size is retained. Vegetation management would ensure that a 65 percent canopy cover with a mean canopy height of 23 to 33 feet would be retained. Herbicide application would be avoided within riparian areas, as described in conservation measure **NX-2** (**Table 3-2**).

Effectiveness: This proposed mitigation measure would minimize impacts to the western yellow-billed cuckoo and its habitat by avoiding construction activities in areas of suitable habitat, restricting disruptive activities within suitable habitat to outside of the active breeding season, and prohibiting alteration of native vegetation in areas of suitable habitat.

Direct and Indirect Effects

The proposed Project could result in the construction and operation disturbance of up to 80 acres (0.4 percent) and 17.5 acres (<0.1 percent), respectively, of modeled potential western yellow-billed cuckoo habitat. These acreages are a conservative estimate of potential habitat impacts and are based on modeled habitat (which is likely an overestimate of the amount of suitable habitat available for this species) and general assumptions about the amount of project impacts per unit length of the transmission line, regardless of habitat. In reality, impacts to yellow-billed cuckoo habitat are expected to be avoided. Aerial photo interpretation indicates that suitable habitat is not likely to be present where the preliminary engineered alignment crosses the Little Snake and Yampa Rivers in Colorado. Moreover, as evidenced by existing, co-located transmission lines where the Proposed Action would cross the Green and Uinta Rivers in Uintah County and the Lake Fork and Duchesne Rivers in Duchesne County, Utah; and the Muddy River and Las Vegas Wash in Clark County, Nevada, riparian habitat in these areas can be spanned by the Project. Consequently, impacts to suitable cuckoo habitat in these areas would be avoided. Impacts to breeding or nesting cuckoos may result from noise generated during pre-construction and construction activities and helicopter use within 0.5 miles of suitable habitat. Individual cuckoos disturbed by anthropogenic noise may avoid areas of suitable habitat or in some cases may abandon active nesting attempts depending on the proximity to the source and intensity of noise. Avoidance of disruptive activity within 0.25 miles of suitable habitat during the nesting season is required under conservation measure **SSWS-6**. Implementation of this measure would reduce the potential for impacts to suitable habitat or abandonment of nests but may not completely eliminate the potential for adverse impacts to individual cuckoos.

In addition to the above, implementation of the Applicant-committed measures and design features and the additional conservation measures listed above would essentially eliminate the potential for this species to be adversely affected by the project during construction. Following construction, the presence of the transmission line would increase the collision potential for western yellow-billed cuckoos, which are long-distance migrants that migrate predominately at night (Crawford and Stevenson 1984).

Implementation of conservation measure **WLF-8**, including use of bird flight diverters over waterbodies, would help to minimize the potential for migrating birds to collide with Project conductors and shield wires. Regardless of the effectiveness of installed bird flight diverters along the transmission line in areas of high bird use, some collision risk to migration cuckoos would still exist due to the presence of tall transmission structures located above vegetation and tree canopies.

As noted above, TransWest has developed a plan for avoiding, minimizing, and monitoring impacts to birds during construction and operation of the Proposed Action. This plan has been incorporated into a single, over-arching document, an APP, which is included in Appendix B of the TWE POD (Appendix D of the Final EIS). The APP outlines principles of avian protection, potential avian interactions with the transmission line facilities, construction design standards, training and monitoring requirements, nest management, and adaptive management in accordance with the APP Guidelines developed by the USFWS and APLIC in 2005 (APLIC 2012). Adherence to the TWE APP would further ensure that potential impacts to the western yellow-billed cuckoo are avoided or minimized.

Cumulative Effects

No reasonably foreseeable non-federal future actions have been identified within the vicinity of the proposed Project action area for the western yellow-billed cuckoo.

Monitoring

There are currently no species-specific monitoring requirements for the western yellow-billed cuckoo within the area of analysis. However, general monitoring of avian interactions along the Proposed Action would occur with implementation of TransWest's APP described above.

Determination

Effect on the Species: Construction and operation of the Proposed Action *may affect but is not likely to adversely affect* the western yellow-billed cuckoo.

Effect on Critical Habitat: The Proposed action *may affect but is not likely to adversely modify* proposed critical habitat.

*Rationale: As noted above, riparian habitat along the Little Snake and Yampa rivers does not appear to be suitable for the western yellow-billed cuckoo. Consequently, construction-related impacts to this habitat would have no effect on this species. Project-related impacts to proposed critical habitat located along the Green River and Lake Fork River, and potentially suitable habitat along the Muddy River and Las Vegas Wash would be avoided by spanning. Implementation of Applicant-committed mitigation measures and design features and the general conservation measures listed above as well as the species-specific conservation measure (**SSWS-6**) described above would further ensure that potential impacts to the western yellow-billed cuckoo are avoided during project construction and operation.*

6.1.3 Reptiles

6.1.3.1 Desert Tortoise (Threatened)

Environmental Baseline

Conservation Status

The Mojave population of desert tortoise was designated as threatened in 1989 under the ESA (54 FR 32326). In 1994, a Draft Recovery Plan was issued. Critical habitat was designated in 1994, encompassing 6 million acres within six management units across California, Nevada, Utah, and Arizona (59 FR 5820). In 2011, the USFWS issued a Final Revised Recovery Plan, which reduced the number of RUs to five and changed some boundaries of the 1994 RUs (USFWS 2011a). Since then, no significant changes in the distribution of the species have been documented despite a decline in local populations, and no status change has been recommended (USFWS 2010a).

The desert tortoise genus is considered as two separate populations: the Mojave Desert population (*Gopherus agassizii*) and the Sonoran Desert population (*Gopherus morafkai*). The Mojave population, is defined as those tortoises north and west of the Colorado River and west of Beaver Dam Slope, Utah, and is distributed throughout southern Nevada, southeastern California, the Beaver Dam Mountains and Virgin River area of southwestern Utah, and northwestern Arizona (Germano et al. 1994; USFWS 2008a, 1990).

Population density studies have been conducted for many years in several areas throughout desert tortoise range; however, inconsistencies in sampling methods, study scale, environmental conditions, and research goals make long-term population trend determinations difficult. Those data could provide a general overview of the species' range-wide status and demonstrate considerable declines at the local level, particularly in the western Mojave Desert (Corn 1994; USFWS 2008a). Berry and Medica (1995), in their U.S. Geological Survey (USGS) report, estimated that densities ranged from approximately 13 to 168 adult tortoises per square mile, depending on location. Berry and Medica (1995) also found a density of approximately 44 tortoises per square mile in southeastern Nevada, and most populations discussed in that report showed a downward trend (Berry and Medica 1995).

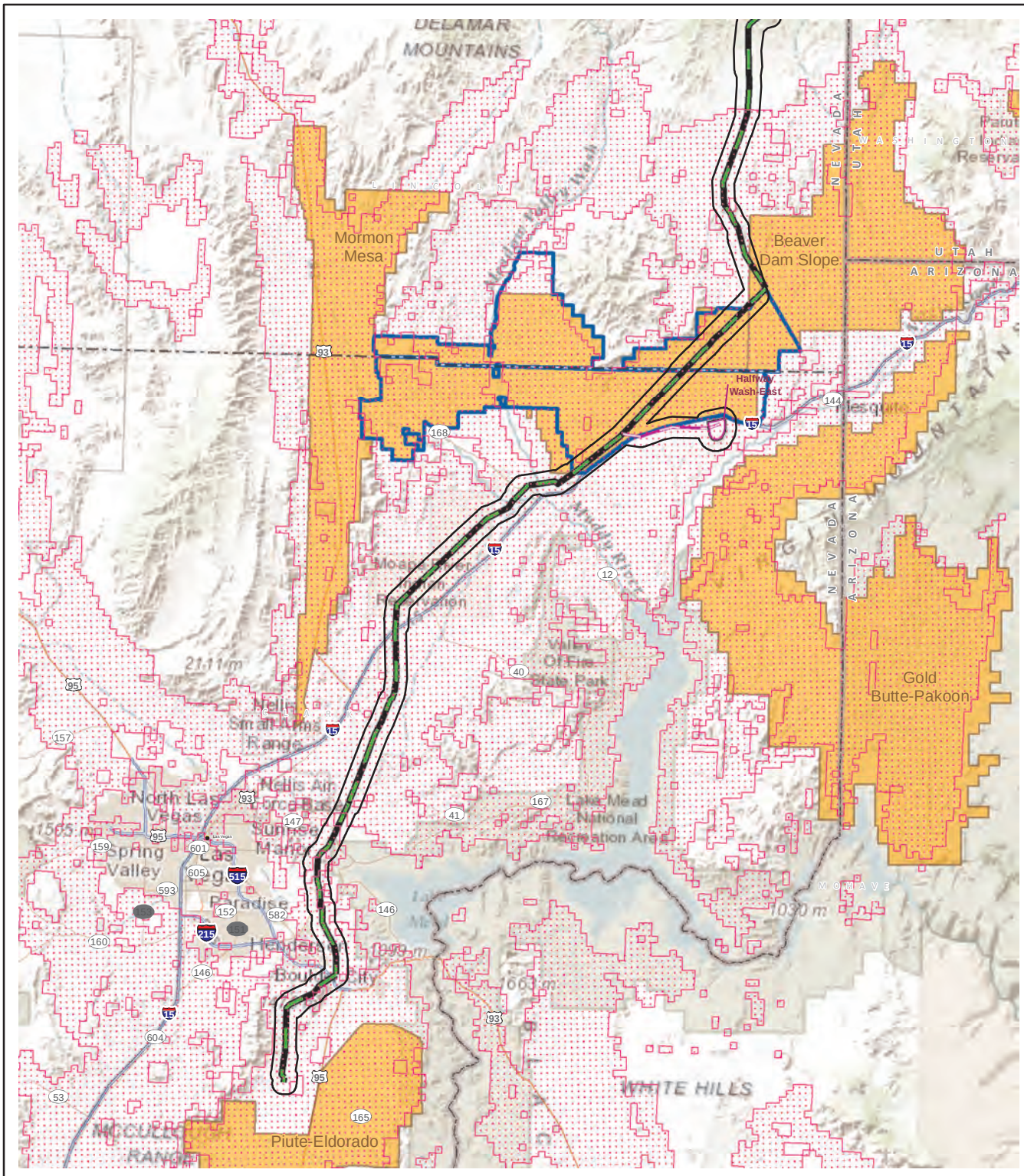
Beginning in 2001 (1999 in the Upper Virgin River RU) annual range-wide monitoring was initiated. Results from the first 5 years of this program estimated a population density low of 2 to 8 tortoises per square mile for the Northeastern Mojave RU and a high of 44 to 78 tortoises per square mile for the Upper Virgin River RU. Because this monitoring program is designed to measure long-term population trends, the first 5 years of the program essentially serve to establish baseline densities and variability between years and between RUs (USFWS 2006b).

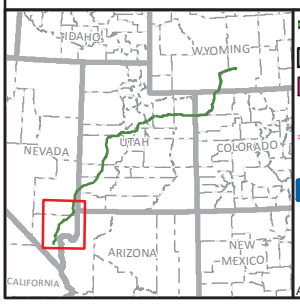
The 1994 recovery plan identified general areas as proposed Desert Wildlife Management Areas where recovery efforts for the desert tortoise would be focused. Based on the recovery plan, USFWS designated critical habitat in February 1994, encompassing over 6,400,000 acres in portions of the Mojave and Colorado deserts (**Figure 6-8; Table 6-2**). This designation includes primarily federal lands in southwestern Utah, northwestern Arizona, southern Nevada, and southern California (USFWS 1994a).

Table 6-2 Desert Tortoise Critical Habitat by State and Land Management (acres)

Management Agency	Arizona	California	Nevada	Utah	Total
Bureau of Land Management	288,582	2,698,907	988,600	93,961	4,070,051
National Park Service	44,381	894,639	103,957		1,042,977
U.S. Fish and Wildlife Service			22,991		22,991
Bureau of Reclamation			3,335		3,335
Department of Defense		460,813			460,813
Department of Energy			499		499
Tribal Land				2,398	2,398
State Land	5,698	82,967		22,492	111,157
Private Land	2,500	600,756	101,959	9,895	715,109
Total	341,161	4,738,082	1,221,341	128,746	6,429,331

Source: USFWS 2011a.





- Proposed Action
- Action Area
- Ground Electrode Siting Area
- Ground Electrode Overhead Electrical Line
- Mormon Mesa ACEC
- Critical Habitat
- Potential Habitat (USGS Modeled 0.6-1.0)

Action Area Buffer for Analysis Area: 0.5 Mile

TRANSWEST EXPRESS TRANSMISSION PROJECT

Figure 6-8
Area of Analysis for
Desert Tortoise

0 5 10 20 Miles
0 5 10 20 km
1:900,000

N

Western AREA POWER ADMINISTRATION

Exported On: 4/3/2015

K:\Projects_4\TransWestExpress\12907_003_Transwest_Express\Figures\DocumentFigures\2015_BA_v2\SWildlife\Fig_6_08_DesertTortoise.mxd

Life History and Habitat Association

Desert tortoises of the Mojave population are found primarily in Mojave Desert scrub habitat. Typical habitat consists of creosote bush scrub vegetation characteristic of the Upper Sonoran life zones of the Mojave and Colorado deserts. Typical desert tortoise habitat extends to 5,500 feet amsl where annual precipitation ranges from 2 to 8 inches; the diversity of perennial plants is relatively high; and production of ephemerals is high. Aside from typical creosote scrub habitat, Mojave Desert tortoises also are associated with creosote bursage, shadscale scrub, and Joshua tree woodland vegetation communities. Some parts of their range contain abundant Joshua trees. Desert tortoises also inhabit mixed blackbrush scrub found in the northern extent of their range between 3,500 and 5,000 feet amsl (NatureServe 2013e).

In the Mojave Desert, tortoises occur most commonly on gently sloping terrain with sandy-gravel soils and a sparse cover of low-growing shrubs, which allows establishment of herbaceous plants. Soils must be friable enough for the digging of burrows, but firm enough so that burrows do not collapse (USFWS 2011a) Tortoise burrows are often located close to washes and arroyos, especially in Mojave Desert habitats consisting of sandy loam soils covered by a more coarse surface of pebbles, cobbles, or desert pavement (Luckenbach 1982).

Of particular importance to desert tortoises is the presence of suitable burrowing substrate and vegetation that offers protective thermal cover for extreme temperatures during the summer months. Desert tortoises can spend more than 98 percent of their lives underground, especially in drought year (Ernst and Lovich 2009). Mojave desert tortoises will usually construct their own burrows to avoid extreme hot or cold temperatures that could cause life-threatening conditions for this ectothermic species. Shelters such as caliche caves or overhangs might be utilized as well. Mojave desert tortoises often excavate burrows under vegetation (such as a creosote bush, ephedra spp., or bursage), which can extend to a depth of 33 feet. Desert tortoises typically use between 12 and 25 different burrows, dens, or pallets over the course of 1 year (Ernst and Lovich 2009). Home ranges of adults tend to be larger than those of juveniles, and male home ranges of an estimated 62 acres are typically twice the size of female home ranges, though individual and seasonal variation can be considerable (O'Conner et al. 1994).

The Mojave desert tortoise mating season typically begins in February or March when they emerge from hibernation, but can last into fall. Between one and seven eggs are laid in an excavated nest near a shrub or burrow entrance between May and July (Ernst and Lovich 2009). Hatching occurs 90 to 120 days later, depending on environmental conditions, especially temperature. Eggs and young are unattended by the parents. Hatchlings develop into females when the incubation (i.e., soil) temperature is greater than 89.3°F and males when the temperature is below that (Spotila et al. 1994). Egg hatch rates vary, but hatchling and juvenile mortalities are assumed to be very high, and it has been estimated that only one hatchling for every 15 to 20 nests will survive to reach sexual maturity. The average age of reproductive viability of females is primarily a function of individual size, but is usually between the ages of 12 and 25 years (USFWS 1994a). Females from the Mojave population produce from one to three clutches of eggs staggered throughout the reproductive season (Turner et al. 1986).

The desert tortoise is normally an obligate herbivore, subsisting largely on various annual and perennial forbs, grasses, cacti, and other non-woody plants (Ernst and Lovich 2009). A study of desert tortoise food habits in the Mojave Desert found that they will consume at least 43 plant species, including 37 annuals and 6 perennials. The diet showed a very strong preference for native plants (95 percent), and some of their preferred food plants were uncommon to rare (Jennings 1997). The most important food items seem to be desert annuals, plants that often have a life span of less than 30 days, and are generally available only from April to June. Preferred plants are often uncommon or rare in tortoise environments (Ernst and Lovich 2009; Jennings 1997). Tortoises are capable of eating large quantities of food when it is available; the contents of a tortoise's digestive tracts can constitute 11 to 21 percent of its total body bass (Ernst and Lovich 2009). Desert tortoises also ingest rocks, bones, and soil, possibly

to maintain intestinal bacteria; to provide additional minerals; or as gastroliths (small stones) to aid digestion (Ernst and Lovich 2009; Esque and Peters 1994).

Threats

The vast majority of threats to the desert tortoise or its habitat are associated with human land uses (USFWS 2011a). Large areas of tortoise habitat in the Mojave Desert have been negatively affected by urbanization, OHV use, overgrazing of domestic livestock, agriculture, construction of roads and utility corridors, military training activities, and litter that could be swallowed by or entangle individual tortoises. Raven predation on hatchling and juvenile tortoises has shifted the composition of the tortoise population to predominantly adults, which has adversely affect recruitment (Berry et al. 1986). Other threats include the proliferation of non-native plant species and higher frequency of anthropogenic fire which both negatively affect tortoises and their habitat (Ernst and Lovich 2009).

The most recent 5-year review in 2010 indicated that threats identified in the original listing rule continue to affect the species today, with invasive species, wildfire, and renewable energy development coming to the forefront as important factors in habitat loss and conversion. Overall, human-induced impacts that cause mortality and widespread habitat loss and fragmentation, such as urbanization, proliferation of roads and highways, OHV activity, grazing, and habitat invasion by non-native invasive species continue to threaten this species (USFWS 2010b).

Recovery

The desert tortoise requires 13 to 20 years to reach sexual maturity, has low reproductive rates during a long period of reproductive potential, and individuals experience relatively high mortality early in life. These factors make recovery of the species very difficult. Even moderate downward fluctuations in adult survival rates can result in rapid population declines. Thus, high survivorship of adult desert tortoises is critical to the species' persistence. Other factors important to desert tortoise recovery include maintaining the genetic variability of the species and sufficient ecological heterogeneity within and among populations to allow tortoises to adapt to changes in the environment over time. Because desert tortoises occupy large home ranges, the long-term persistence of extensive, intact habitat is essential for the survival of the species (USFWS 2011a).

In 2011, the USFWS issued a Final Revised Recovery Plan. Five RUs were established to provide for movement, dispersal, and gene flow; sufficient quantity and quality of forage species and the proper soil conditions to provide for the growth of such species; suitable substrates for burrowing, nesting, and overwintering; burrows, caliche caves, and other shelter sites; sufficient vegetation for shelter from temperature extremes and predators; and habitat protected from disturbance and human-caused mortality (USFWS 2011a). In addition, the 2011 Recovery Plan designated a recovery priority number of 12C and is predicated upon: 1) a moderate degree of threat, which, although increased since 1994, does not place the species at imminent risk of extinction; 2) a low potential for recovery, adjusted based on current uncertainties about various threats and ability to manage them; 3) listed population below the species level; and 4) potential conflict with development or other forms of economic activity (USFWS 2011a).

The goals of the 2011 Recovery Plan are recovery and delisting of the desert tortoise. A wide range of threats affect desert tortoise and their habitat; however, little is known about their demographic impacts on tortoise populations or the relative contributions each threat makes to tortoise mortality. Therefore, specific and meaningful threats based recovery criteria were not identified in the 2011 Recovery Plan. However, the USFWS has established three recovery objectives (USFWS 2011a) including:

1. Recovery Objective 1 (Demography): maintain self-sustaining populations of desert tortoises within each RU into the future.
    - Recovery Criterion 1: Rates of population change (λ) for desert tortoises are increasing (i.e., $\lambda > 1$) over at least 25 years (a single tortoise generation).

2. Recovery Objective 2 (Distribution): maintain well-distributed populations of desert tortoise throughout each RU.
    - Recovery Criterion 2**.** Distribution of desert tortoises throughout each tortoise conservation area is increasing over at least 25 years (i.e., ψ [occupancy] > 0).
3. Recovery Objective 3 (Habitat): ensure that habitat within each RU is protected and managed to support long-term viability of desert tortoise populations.
    - Recovery Criterion 3. The quantity of desert tortoise habitat within each desert tortoise conservation area is maintained with no net loss until tortoise population viability is ensured. When parameters relating habitat quality to tortoise populations are defined and a mechanism to track these parameters established, the condition of desert tortoise habitat also should be demonstrably improving.

If recovery actions are implemented promptly and are effective, including continued implementation of the current monitoring program which began in 2001, recovery criteria could be met by approximately 2025 (USFWS 2011a).

Assessment of Effects

Area of Analysis

The desert tortoise analysis area is defined as potential habitat (USGS modeled 0.6 – 1.0) and designated critical habitat within the action area, plus a 0.5-mile buffer centered on the ROW. The action area is defined in Section 2.2. These areas represent a total of 300,857 acres of desert tortoise habitat including 249,538 acres of potential habitat and 51,319 acres of desert tortoise critical habitat. These areas are depicted in **Figure 6-8**.

The transmission line corridor and engineered alignment cross USGS modeled habitat and USFWS designated critical habitat for desert tortoise in Clark and Lincoln counties, Nevada and in Washington County, Utah. The desert tortoise analysis area includes areas of high quality habitat that the USGS habitat model values 0.7 to 1.0. USGS habitat model ranks desert tortoise potential habitat on a scale from 0 to 1, where 1 indicates perfect model performance, 0.5 indicates the equivalent of a random guess, and less than 0.5 indicates performance worse than random (USGS 2011). The entire desert tortoise analysis area is located within the northeastern Mojave Desert RU (USFWS 2008a). Critical habitat units within this RU, and within the desert tortoise analysis area are: 1) Gold Butte-Pakoon Unit, Clark County, Nevada; 2) Beaver Dam Slope Unit, Lincoln, County, Nevada; 3) Beaver Dam Slope Unit, Washington County, Utah; and 4) Mormon Mesa Unit, Clark and Lincoln counties, Nevada (59 FR 5820).

Probabilistic desert tortoise surveys conducted in 2013 (AECOM 2014), 100 percent coverage surveys conducted for the Southern Nevada Intertie Project (2010), and existing data gathered from NNHP have confirmed the presence of desert tortoise along portions of the action area in southern Nevada. Survey data from AECOM (2014) was used to calculate a tortoise abundance estimate for the desert tortoise analysis area using the tortoise abundance formula described in the 2010 Pre-Project Field Survey Protocol for Potential Desert Tortoise Habitats (USFWS 2010b). Using the USFWS desert tortoise abundance and confidence interval equations, the mean number of desert tortoises within the survey area was estimated to be 60 individuals, with a 95 percent confidence interval and a range of 21:170 (AECOM 2014).

Conservation Measures

Impacts to the desert tortoise, its habitat, and critical habitat would be minimized through implementation of the following design features and conservation measures described in Chapter 3.0:

- Applicant-committed conservation measures and design features: TWE-29, TWE-31, TWE-32, TWE-33, and TWE-34.
- Conservation measure: **SSWS-15** and **SSWS-16**.

The following additional conservation measures are proposed to avoid or reduce effects of the Proposed Action on the desert tortoise:

- **SSWS-4**: To avoid and minimize impacts to the desert tortoise and its habitat, TransWest would coordinate with the BLM, Western, Boulder City, Clark County (Nevada), Bureau of Reclamation, and USFWS to implement appropriate conservation measures during construction, including but not limited to:

    1. Depending on the distance between concurrent construction activities in desert tortoise habitat, TransWest would provide at least one Field Contact Representative (FCR) to be responsible for overseeing compliance with protective measures for the desert tortoise. Where the distance between activities is over 100 miles, an additional FCR would be required. The FCR would be an authorized biologist approved by the BLM, applicable state wildlife agencies, such as the Nevada Department of Wildlife (NDOW) and the USFWS and would be present during all project activities within desert tortoise habitat. TransWest would ensure that FCR(s) and supporting authorized biologists and desert tortoise monitors would have authority to halt any activities that are in violation of the stipulations in the Biological Opinion (BO) for the project. The FCR would prepare and submit a daily report to the BLM and USFWS for all work activities within desert tortoise habitat.
    2. All TransWest employees and its contractors working in the field would be required to complete a desert tortoise education program prior to reporting in the field. The program would be approved by the BLM and USFWS and would cover such topics as desert tortoise distribution within the Project Area, general behavior and ecology, sensitivity to human activities, legal protection, penalties for violation (ESA), conservation and protection measures, reporting requirements, fire prevention, etc. All field workers would be instructed that activities must be confined to locations within the approved areas. The program would instruct participants to report all observations of desert tortoises and their sign during construction activities to the nearest tortoise monitor or authorized biologist who would, in turn, inform the FCR.
    3. An authorized desert tortoise biologist would possess at least a bachelor's degree in biology, ecology, wildlife science, herpetology, or closely related fields as determined by the BLM, NDOW, and USFWS. The authorized biologist must have demonstrated prior field experience using accepted resource agency techniques to survey for desert tortoises and tortoise sign. Authorized biologists would have special training in accepted techniques for moving desert tortoises, excavating tortoise burrows and relocating burrow contents including tortoises and eggs. As a guideline, USFWS approval of an authorized biologist requires that the applicant have at least 60 days project experience as a desert tortoise monitor. In addition, the biologist would have the ability to recognize and accurately record survey results and must be familiar with the terms and conditions of the BO that resulted from project-level consultation between BLM and the USFWS. All tortoise biologists would be familiar with the Desert Tortoise (Mojave Population) Field Manual (USFWS 2009).

        Desert tortoise monitors would possess at least a bachelor's degree in biology, ecology, wildlife science, herpetology, or closely related fields as determined by the BLM and USFWS and have prior field experience using accepted resource agency techniques to survey for desert tortoises and tortoise sign. Desert tortoise monitors would not be permitted to move tortoises or excavate tortoise burrows. All FCRs, other authorized biologists, and tortoise monitors would have the ability to recognize and accurately record biological information in the field.

4. TransWest would coordinate with the BLM and USFWS to ensure that an appropriate number of authorized biologists and tortoise monitors are onsite during construction to ensure the protection of desert tortoises. TransWest would submit the names of all authorized biologists and tortoise monitors to the BLM and USFWS for review and approval at least 30 days prior to initiation of any desert tortoise clearance surveys. Project activities would not begin until authorized biologists and tortoise monitors have been approved. Replacements of authorized biologists and tortoise monitors would require BLM and USFWS approval. Authorized biologists would be assigned to monitor each area of activity where conditions exist that may result in take of desert tortoise (for example, clearing, construction, grading, recontouring, and reclamation activities). The BLM and TransWest would ensure that a tortoise monitor or authorized biologist would be assigned to each piece/group of large equipment. All authorized biologists and tortoise monitors would be responsible for determining compliance with terms and conditions of the BO, the Project ROD, and other applicable agreements. With input from authorized biologists and tortoise monitors, the FCR(s) would maintain a detailed record of all desert tortoises encountered during project surveys and monitoring.

5. All construction vehicle movement outside of the ROW would to be restricted to pre designated access, contractor acquired access, or public roads. Any routes of travel that require construction or modification would have an authorized biologist or desert tortoise monitor survey the area for tortoises prior to modification or construction of the route. Off-road travel by vehicles and equipment would be prohibited.

6. To limit the potential for adverse impacts resulting from contact with construction equipment, vehicles, and personnel, TransWest would implement a Project area vehicle speed limit of 15 mph during the tortoise active season (temperatures >65ºF) and 20 mph during the tortoise inactive season (temperatures <65ºF).

7. Whenever a vehicle or construction equipment is parked longer than 2 minutes within desert tortoise habitat, whether the engine is engaged or not, the ground around and underneath the vehicle would be inspected for desert tortoises prior to moving the vehicle. If a desert tortoise is observed, the vehicle would not be moved and an authorized biologist would be contacted. If possible, the tortoise would be left to move on its own. If the tortoise does not move within 15 minutes, the tortoise would be removed and relocated by the authorized biologist in accordance with the tortoise handling procedures, as presented in the Desert Tortoise Field Manual (USFWS 2009), which should be included or incorporated by reference in the POD.

8. The area of construction activity will be pre-determined with removable flagging and confine all activities to these areas. All construction sites and access roads would be clearly marked or flagged at the outer limits prior to the onset of any surface-disturbing activity. All personnel would be informed that their activities must be confined within the marked or flagged areas. No permanent paint or other marking agents would be applied to vegetation or rocks.

9. All desert tortoise burrows and pallets that fall outside of, but within 50 feet of, the construction work area would be flagged for avoidance. Desert tortoise burrows would not be marked in a manner that facilitates poaching or provides a cue for predators. Avoidance flagging would be designed to be easily distinguished from access route or other flagging, and would be designed in consultation with experienced construction personnel and authorized biologists. All flagging would be removed immediately following construction activities.

10. Construction sites, staging areas, and access routes would be cleared by an authorized tortoise biologist before the start of construction. An authorized biologist(s) would survey the site for desert tortoises using survey techniques providing 100 percent coverage of the area proposed for disturbance. If construction occurs during the desert tortoise active season

(March 1 through October 31), or when temperatures and environmental conditions are conducive to tortoise activity as stated in the USFWS Desert Tortoise Handbook or determined by an authorized biologist, two surveys would occur to ensure all live tortoises have been cleared from the area of potential disturbance. The first survey would be conducted within 14 days prior to surface-disturbance; the second survey would occur immediately before surface disturbance. During the inactive season (November 1 through February 28, except as noted above) when conditions are not conducive to tortoise activity as determined by an authorized biologist, one survey would occur within 72 hours of surface disturbance or up to 5 days in advance of disturbance if conditions are not favorable for tortoise activity.

11. To limit the potential for adverse impacts resulting from contact with construction equipment, vehicles, and personnel, TransWest would ensure that all construction-related activities are monitored by an authorized biologist or desert tortoise monitor with the authority to stop construction activities upon the detection of a tortoise within the Project area. During the active season (March 1 – October 31), an authorized biologist or approved desert tortoise monitor would be onsite for the duration of construction activities in desert tortoise habitat. During the inactive season (November 1 through February 28, except when conditions are conducive to tortoise activity (i.e., when temperatures are above 65°F), authorized biologists or desert tortoise monitors would be onsite during all phases of transmission line construction to ensure that all construction vehicles and heavy equipment remain within the boundaries of the marked construction zone. If necessary, an authorized desert tortoise biologist would be brought on site to excavate any tortoise burrow that might be impacted.

12. Desert tortoises and eggs found within construction sites would be removed by authorized desert tortoise biologists in accordance with the most current protocols identified by BLM and USFWS. If any tortoise active nests are encountered, USFWS would be contacted immediately, prior to removal of any tortoises or eggs from those burrows, to determine the most appropriate course of action. Unoccupied burrows would be collapsed or blocked to prevent tortoise re-entry. All desert tortoises located in harm's way would be relocated to safe areas up to 1,000 feet from the point of capture. Desert tortoises that are found above-ground would be placed in the shade of a shrub and out of harm's way, following the most current protocol approved by BLM and USFWS. Relocated tortoises would not be placed in existing occupied burrows. If an existing burrow that is similar in size, shape, and orientation to the original burrow is unavailable, the authorized biologist would construct one. Desert tortoises moved during inactive periods would be monitored for at least two days after placement in the new burrows to ensure their safety. The authorized biologist would be allowed some judgment and discretion to ensure that survival of the desert tortoise is likely. Desert tortoises would not be placed on lands outside the administration of the federal government without the written permission of the landowner. Desert tortoises would be purposely moved only by authorized tortoise biologists and solely for the purpose of moving them out of harm's way.

13. Authorized desert tortoise biologists would follow procedures for handling tortoises in accordance with the most current protocols identified by BLM and USFWS. All tortoises would be handled using disposable surgical gloves. The gloves would be disposed of after handling each tortoise. Equipment or materials that contact desert tortoises would be sterilized, disposed of, or changed before contacting another tortoise. The authorized biologist would document each tortoise encounter/handling with the following information, at a minimum: a description of the situation; vegetation type; date of observation; weather conditions; condition and health; any apparent injuries and state of healing; if moved, the GPS location from which it was captured and the location in which it was released; map locations; whether the animal voided its bladder; and identifying markings (that is, identification numbers marked on lateral scutes or attached transmitters).

14. If desert tortoises need to be moved at a time of day when harmful ambient temperatures exist (i.e., less than 40°F or greater than 95°F or 35°C at 5 cm aboveground or 43°C at ground surface), they would be held overnight in a clean plastic box. These tortoises would be kept in the care of the authorized biologist under appropriate controlled temperatures and released the following day when temperatures are favorable. All cardboard boxes would be appropriately discarded after one use and never hold more than one tortoise.

15. Any excavated holes or trenches related to transmission line construction (e.g., tower foundations, ground electrode wells) left open overnight would be covered and/or tortoise-proof fencing would be installed to prevent the possibility of tortoises falling into the open holes. Any tortoise found in an excavated hole or trench would be promptly removed by an authorized desert tortoise biologist in accordance with USFWS-approved protocols or if the biologist is not allowed to enter the excavation for safety reasons, the alternative method for removal must have prior approval by USFWS. Tortoise escape ramps would be placed inside the excavation or trench so as to not entrap tortoises. All excavations would be inspected for tortoises before filling.

16. Any construction pipe, culvert, or similar structure with a diameter greater than 3 inches left above ground on the construction site for one or more nights would be inspected for tortoises before the material is moved, buried, or capped. As an alternative, all structures may be capped before being stored on the construction site.

17. Permanent tortoise-proof fencing would be installed around the perimeters of the Southern Terminal and approved ground electrode site to prevent tortoises from wandering onto the Project site where they would be in harm's way. Any gates or gaps in the fence would be constructed and operated so as to prevent tortoise entry (e.g., "tortoise guards and/or keeping gates closed). Tortoise fencing would be inspected on a daily basis during ground disturbing activities to ensure that there are no breaches in the fencing material. Fence specifications would be consistent with those approved by the USFWS (USFWS 2009). Permanent tortoise-proof fencing along the project area would be appropriately constructed, monitored, and maintained. Fencing would be inspected in accordance with Table SSWS-4.1 unless modified by the USFWS. Monitoring and maintenance would be conducted by TransWest staff or contractors and would include removal of trash and sediment accumulation and restoration of zero ground clearance between the ground and the bottom of the fence, including re-covering the bent portion of the fence if not buried. Maintenance activities would occur regularly for the life of the project and would be carried out concurrently and in conjunction with fence inspections. Fence monitoring and maintenance activities would be documented as they occur and this documentation would be provided to the BLM on a quarterly basis.

18. Water applied for dust control would not be allowed to pool outside of desert tortoise fenced areas, as this can attract desert tortoises. Leaks from water trucks or water tanks would be promptly repaired to prevent pooling water. During the desert tortoise active season, an authorized biologist or desert tortoise monitor would be assigned to patrol each area being watered. This individual would patrol the area immediately after the water is applied and at approximate 60-minute intervals until the ground is no longer wet enough to attract tortoises. No dust palliatives (e.g., calcium or magnesium chlorides, dust oils, plant or animal extracts, enzymes, synthetic polymers, etc.) other than water are approved for use in desert tortoise habitat.

19. In construction areas where re-contouring is not required, vegetation would be left in place wherever possible and original contours would be maintained to avoid excessive root damage and allow for re-sprouting.

20. If blasting is necessary, a 200-foot radius area around the blasting site would be surveyed and all desert tortoises located aboveground within this 200-foot radius of the blasting site would be moved 500 feet from the blasting site, placed in an unoccupied burrow, and

temporarily penned to prevent tortoises that have been temporarily relocated from returning to the site. Tortoises in burrows would be left in their burrows. All burrows, regardless of occupied status, would be stuffed with newspapers, flagged, and location recorded using a GPS unit. Immediately after blasting, newspaper and flagging would be removed. If a burrow or cover site that could be occupied has collapsed, it would be excavated to ensure that no tortoises have been buried and are in danger of suffocation.

21. Constructed road berms would be less than 12 inches in height and have slopes of less than 30 degrees. Where road berms consist primarily of rocks, gaps would be opened to allow for tortoise passage.

22. To prevent mortality, injury, and harassment of desert tortoises and damage to their burrows and cover sites, no pets would be permitted in any Project construction area.

23. To limit the potential for predation of desert tortoise by corvids and raptors, TransWest would construct self-supporting tubular/monopole towers with perch discouragers throughout USFWS-designated critical habitat and in all tortoise habitat (USGS model rating of 0.6 or higher) where the Project is not co-located with existing transmission lines with steel lattice towers. Islands of non-habitat (USGS model rating of <0.6) within surrounding tortoise habitat (USGS model rating of 0.6 or higher) also will be subject to self-supporting tubular/monopole towers with perch discouragers.

24. To limit the potential for predation of desert tortoise by corvids, TransWest would prepare a Raven Management Plan (in accordance with BLM Southern Nevada District requirements) that outlines active adaptive management strategies for controlling raven predation and nesting within the Project ROW, including post-construction monitoring for ravens and removal of raven nests, consistent with the restrictions implemented by the Migratory Bird Treaty Act. If evidence of raven nesting is observed in the ROW, the USFWS would be notified within three calendar days.

25. To limit the potential for predation of desert tortoise by corvids, coyotes, feral dogs, and other opportunistic predators, TransWest would require all construction waste to be contained and removed from the Project area in a manner that does not attract corvids to the Project area. All trash and food items would be placed in raven-proof containers and removed daily.

26. The use of herbicides within USFWS-designated critical habitat, ACECs, and general desert tortoise habitat (USGS model rating of 0.6 or higher) would be prohibited without prior approval from the USFWS, BLM, and applicable state wildlife agency.

27. TransWest would coordinate with the BLM to ensure that appropriate measures are implemented to minimize public access and use of the transmission line ROW following completion of the project. Such measures may include signs and substantial physical barriers, and rehabilitation actions that would make the ROW impassible to vehicles.

28. To compensate for desert tortoise habitat affected during construction, TransWest would offset these effects through either an acceptable land acquisition or an assessed financial contribution, based on the final construction footprint. The BLM requires Section 7 desert tortoise mitigation fees for all acres of new disturbance (permanent and temporary). As of March 1, 2015, the current rate is $834 per acre for tortoise habitat and is subject to a multiplier ranging from 1 to 6. The multiplier(s) used for TWE would be determined by USFWS based on habitat quality, timing and duration of impacts, existing and adjacent levels of disturbance, and other factors. This rate will increase on March 1, 2015.

29. Upon completion of construction, a thorough inspection of the site would be conducted by the FCR(s) and authorized biologists to determine the extent of compliance with the conditions of USFWS's BO, including agreements between TransWest and the agencies. Annual and comprehensive final project reports would be submitted to BLM and the USFWS's Southern Nevada Fish and Wildlife Office in Las Vegas. Project reports would

document the numbers and locations of desert tortoises encountered, all instances of tortoise take resulting from harassment, harm, injury, or mortality, their disposition, effectiveness of protective measures, practicality of protective measures, recommendations for future measures that allow for better protection or more workable implementation, and the number of acres disturbed. Annual reports would cover the calendar year and are due April 1 of the following year (e.g., the annual report for calendar year 2014 is due April 1, 2015). Final project reports are due within 60 days following completion of the project or each phase of the project.

30. All vehicles and equipment that are not in areas enclosed by desert tortoise exclusion fencing would stop activities in desert tortoise habitat during rainfall events in the more-active season (generally March 1 to October 31), and if temperatures are above 60°F but below 95°F for more than 7 consecutive days. The FCR or designee would determine, in coordination with the BLM and USFWS, when it is appropriate for project activities to continue.

31. Any deaths and injuries of desert tortoises would be investigated as thoroughly as possible to determine the cause. The wildlife staff of the USFWS Las Vegas FO (702-515-5230), BLM Las Vegas FO (702-515-5000), BLM Caliente FO (775-726-8100) and Nevada Department of Wildlife Las Vegas Office (702-486-5127) must be verbally informed of desert tortoise injuries or death immediately and within 5 business days in writing (electronic mail is sufficient). The FCR or other authorized desert tortoise biologist would complete a Desert Tortoise Handling and Take Report.

TranWest would undertake the following measures to minimize potential project effects on desert tortoises during operation and maintenance activities:

32. TransWest would submit a list of planned maintenance activities by name, category, location, and approximate start date to the BLM Las Vegas and Caliente FOs. TransWest also would forward the list of activities to the USFWS and state agencies. The agencies would have 30 days following receipt of the report to consider the proposed action. In the event of a rejection, TransWest would work with the agencies to resolve issues. Agency approval of the proposed list of projects is valid for one year after agency acceptance.

33. The following measures would apply to normal maintenance activities that do not result in new disturbance.

    a. All TransWest employees and its contractors involved with transmission line ROW inspection and maintenance activities would be required to take a tortoise education program described previously (Measure 2).

    b. If desert tortoises or their burrows occur in the work area, TransWest would implement appropriate measures described previously.

    c. Upon completion of each maintenance activity in the ROW, all used material and equipment would be removed from the site. This condition does not apply to fenced sites.

    d. Routine road surface maintenance activities on existing access and/or patrol roads would be conducted during the inactive season of the desert tortoise, unless accompanied by an authorized biologist. Localized repair of major damage may take place throughout the year.

34. All mitigation measures stipulated for construction activities during the construction phase for the desert tortoise inactive season would be applicable to operation and maintenance activities that result in surface disturbance during the inactive season.

35. All mitigation measures stipulated for construction activities during the construction phase for the desert tortoise active season would be applicable to operation and maintenance activities that result in surface disturbance during the active season.

36. All maintenance activities in critical tortoise habitat that use heavy equipment (whether there is surface disturbance or not) would require an authorized desert tortoise biologist to be on-site during the active season and on-call during the inactive season.

37. The following measures would apply to maintenance activities that may extend outside the transmission line ROW corridors.

    a. In addition to measures (b) and (c), TransWest would implement appropriate measures for operations and maintenance activities described for construction-phase activities (Measures 1-31, above);

    b. For maintenance activities that result in surface disturbance during the active season of the desert tortoise: the width of the activity corridor would be determined prior to the onset of ground-disturbing activities. Work areas would be restricted to the narrowest possible corridors and generally would not be expected to extend beyond the Project ROW; and

    c. TransWest would contact the BLM if activities may extend outside of the transmission line ROW in all or in part; re-initiation of section 7 consultation may be required for activities that extend beyond the ROW.

38. Emergency Repairs: for emergency situations, TransWest would notify the local BLM and USFWS offices within 48 hours. As a part of this emergency response, the BLM and USFWS may require specific measures to protect desert tortoises. During cleanup and repair, the agencies also may require measures to recover damaged habitats.

Effectiveness: All mitigation measures proposed to reduce impacts from the Project upon the desert tortoise have been developed in coordination with the USFWS, BLM Utah, BLM Nevada, UDWR, NDOW and other stakeholders. While the majority of specific measures listed under SSWS-4 are commonly accepted practices intended to avoid and minimize the potential for direct impacts to tortoises proven to be effective when applied to proposed projects within desert tortoise habitat, effectiveness determinations of certain practices and transmission structure types intended to avoid and minimize adverse indirect impacts to desert tortoise populations remain unclear.

Depredation of juvenile tortoise and nests has been attributed to multiple species, including common ravens. Common raven abundance has been documented to increase in response to newly constructed transmission lines (Coates et al. 2014; Howe et al. 2014). Recent research has documented increased raven abundance along transmission lines constructed of self-supporting tubular structures (Gibson et al. 2013) and other studies have been unable to identify significant differences in raven abundance between common transmission structure types (Steenhof et al. 1993). There are mixed conclusions in the scientific literature regarding reducing the occurrence of raven and raptor nests through the use of monopole structures. However, the BLM anticipates that transmission structures of solid construction are harder for large avian predators to nest on in comparison to the lattice structures, as suggested in Boarman (2003) and supported by empirical data in Dixon et al. (2013).

Perch deterrents were initially designed to reduce electrocution risks by discouraging birds from perching on smaller distribution power poles and transmission towers in locations were the separation distance between charged and grounded components was less than the average wingspan of common avian species and are not intended to remove all perching opportunities along a transmission line (APLIC 2006). Research into the use of perch deterrents has shown that the effectiveness of specific deterrents is limited and can vary by deterrent type and transmission structure configuration. Lammers and Collopy (2007) concluded that the use of perch deterrents were ineffective in completely eliminating perching by avian predators within occupied greater sage-grouse habitat in Nevada, but were shown to result in reduced perching duration by predators upon transmission structures. The effectiveness of perch deterrents can

vary by design and transmission structure type, but has been shown in significance tests to reduce perch frequency, duration, and prey captures (Dwyer and Doloughan 2014; Lammers and Collopy 2007; Oles 2007 [not peer reviewed]; Slater and Smith 2010,).

Although current scientific literature does not provide direct support of the effectiveness of these measures, the BLM's requirement to install self-supporting tubular structures and perch deterrents within designated critical habitat and in suitable desert tortoise habitat (USGS model rating of 6.0 or greater) where the Proposed Action would not be co-located with existing steel-lattice tower transmission lines is supported by unpublished data collected from monitoring of other recent transmission line projects in Nevada that have installed these design features to reduce perching opportunities and avian predation.

Direct and Indirect Effects

Potential impacts to the desert tortoise would result from incremental increases in habitat fragmentation caused by vegetation removal and other surface-disturbing activities associated with transmission line construction and operation. Direct impacts to desert tortoise habitat would occur as a result of the construction and operation disturbance of 2,023 acres (0.8 percent) and 603 acres (0.2 percent), respectively, of potentially suitable habitat within the analysis area. Approximately 377 acres (0.7 percent) and 117 acres (0.2 percent) of impact would occur to USFWS-designated desert tortoise critical habitat as a result of construction and operation activities, respectively. Approximately 112 miles of the Proposed Action is located in known or potential tortoise habitat (USGS model rating ≥ 0.6) within the North-East Mojave Recovery Unit.

Suitable habitat adjacent to disturbed areas would continue to be available for use by this species. However, displacement would increase competition and could result in some local reductions in desert tortoise populations if adjacent habitats are at carrying capacity. Potential impacts also could include burrow abandonment or loss of eggs or young.

Other direct impacts could occur as a result of mortality caused by construction equipment and support vehicles crushing individuals and destroying burrows, increased illegal collection of desert tortoises by construction workers or the public, and entrapment of tortoises in excavations. Long-term increases in vehicle traffic and human activity associated with operations also could have adverse effects on the desert tortoise. These impacts would be avoided or minimized by implementation of conservation measure **SSWS-4**, described above.

Operation-related impacts to desert tortoises would include increased human presence and noise during maintenance activities, which also could result in displacement. Implementation of the design features, general conservation measures, and the species-specific conservation measure **SSWS-4** would eliminate or minimize potential for desert tortoise mortality resulting from crushing by Project vehicles and equipment, entrapment in Project excavations, tortoise handling by untrained construction workers or the public, and removal of tortoises by construction workers or the public for pets.

Implementation of SSWS-4 also would minimize the potential for increased perching by a variety of raptor species and ravens, which may depredate juvenile desert tortoises. This measure also would minimize the potential for trash and food scraps to be left on site during construction and maintenance activities. Trash left on site can attract ravens and lead to detrimental effects to juvenile tortoise that are susceptible to predation due to their soft shells. Conservation measures also would minimize the potential for invasion of the action area by nonnative grasses and the potential for increased fire frequency, which also can adversely affect desert tortoises.

Cumulative Effects

No reasonably foreseeable non-federal actions have been identified within the vicinity of the desert tortoise analysis area.

Monitoring

There is short-term monitoring required in the Raven Management Plan for raven nests along transmission lines for the first 3 years during the breeding season that would require annual reporting. Long-term monitoring would include surveying for raven nests along the transmission line once per year during a maintenance flight.

Determination

Effect on the Species: Construction and operation of the Proposed Action *may affect, and is likely to adversely affect* the Mojave desert tortoise. Construction and operation activities could result in direct mortality to individuals, increased predation on the species, and reduction in habitat quality.

Effect on Critical Habitat: Construction, operation, and maintenance of the Proposed Action *may affect, and is likely to adversely affect* critical habitat for the Mojave desert tortoise.

*Rationale: Desert tortoises are known to occupy habitat within the Project action area in Lincoln and Clark counties, Nevada. Although implementation of the design features and conservation measures listed above and described in Chapter 3.0 and the species-specific measures under **SSWS-4** described above would minimize Project-related impacts to this species, it is unlikely that all impacts to desert tortoise would be avoided. To the extent that construction and operation activities could result in a reduction of habitat quality and direct or indirect mortality of individuals, the Project would have some adverse effect on this species. The Proposed Action would cross approximately 26 miles of designated critical habitat for the Mojave desert tortoise in the Mormon Mesa Critical Habitat Unit. Consequently, construction and operation activities would have unavoidable direct and indirect effects on desert tortoise critical habitat.*

6.1.4 Fish

6.1.4.1 Bonytail (Endangered)

Environmental Baseline

Conservation Status

Bonytail was listed as endangered under the ESA on April 23, 1980 (45 FR 27710). In 1994, the USFWS designated seven reaches of the Colorado River system as critical habitat for this species (59 FR 13374). A recovery plan was published for bonytail in 2002 (USFWS 2002b).

Currently, no self-sustaining populations are known to exist in the wild, with very few individuals being reported throughout the Colorado River Basin (USFWS 2002b). Wild adult bonytail have been captured in Lake Powell, Mohave Lake, and Lake Havasu and tributaries of the Colorado River. The most recent bonytail captures in the Upper Colorado River Basin (lower Yampa River and lower Green River below the Yampa River) occurred in the 1960s and 1970s shortly after the closure of the Flaming Gorge Dam. A few single captures were reported in the 1980s since that time. The recent trend for bonytail is unknown because of the few bonytail captures in the past 25 years. The wild population is considered to be in decline (NatureServe 2013a).

Life History and Habitat Association

Currently, no self-sustaining bonytail populations exist in the wild and very few individuals have been captured throughout the Colorado River system (USFWS 2002b). Bonytail have been collected in the Yampa River in Dinosaur National Monument, the Green River in Gray and Desolation canyons, the

Colorado River near Black Rocks and Cataract Canyon, Lake Mohave near the Arizona-Nevada border, and Lake Havasu in Arizona and California (USFWS 2002b).

The general types of habitat used by bonytail consist of mainstem riverine areas and impoundments in the Colorado system. Deep pools and eddies with slow to fast currents are characteristic of the riverine habitat (Kaeding et al. 1986). Based on five specimens captured in the Upper Colorado Basin, four were captured in deep, swift, rocky canyon areas (i.e., Yampa Canyon, Black Rocks, Cataract Canyon, and Coal Creek Rapid) (USFWS 2002b). The fifth specimen was collected in Lake Powell. All fish collected in the Lower Colorado Basin since 1974 were in reservoir habitats. Habitats required for conservation of the species include river channels and flooded, ponded, or inundated riverine areas, especially where competition from non-native fishes is absent or reduced (59 FR 13374-13400).

It is assumed that spawning occurs in June or July, based on fish being observed in reproductive condition at 18ºC (USFWS 2002b). The highest survival rate for hatchery-reared bonytail was 20ºC to 21ºC. Spawning has been observed in reservoirs over rocky shoals and shoreline areas (USFWS 2002b). Flooded bottomland habitats are considered important growth and conditioning areas, particularly as nursery areas for young. This species is a broadcast spawner that scatters adhesive eggs over gravel substrate at depths up to 30 feet. Newly hatched larvae and young bonytail develop in flooded bottomlands.

Seven reaches in the Colorado River system are designated as critical habitat for bonytail, including portions of the Colorado, Green, and Yampa rivers in the Upper Basin and the Colorado River in the Lower Basin (59 FR 13374-13400). In total, critical habitat for bonytail is 312 river miles. Critical habitat consists of the 100-year floodplain in the seven reaches where constituent elements including water, physical habitat, and biological requirements are present.

Threats

Threats to bonytail are considered to be a combination of the following factors: direct loss of habitat, changes in temperature and flow, blockage of migration routes from the construction of large reservoirs, competition with and predation by nonnative fish species, hybridization, and water quality contamination (USFWS 2002b). A summary of these threats is provided below.

- Direct Loss of Habitat – Population declines were reported in the Colorado River system following a period of dam construction throughout the Colorado River Basin.
- Temperature and Flow Changes – Coldwater releases downstream of dams have created temperature regimes outside of the thermal preferences of bonytail and eliminated turbid conditions that historically provided cover from predators (USFWS 2012d). Fish passage structures were constructed at the Redlands Water and Power Diversion Dam (Gunnison River) and the Grand Valley Irrigation Company Diversion Dam (Colorado River), and modified at the Price-Stubb Dam and Government Highline Dam in the Upper Colorado River to allow adequate movement of bonytail. Flows also have been reduced as a result of dam operation and the continual withdrawal of water within the Colorado River Basin. Flow recommendations have been developed throughout the Green River and the Upper Colorado subbasins to assist in managing habitat for the bonytail and other endangered fishes.
- Fish Movement Blockage – Seven barriers have been identified in the Upper Colorado River Basin upstream of Glen Canyon Dam within occupied bonytail habitat (USFWS 2012d).
- Competition and Predation from Nonnative Fishes – The introduction and development of nonnative fish species in the Upper and Lower Colorado system has resulted in negative interactions to bonytail (USFWS 2002b). Predator species that have been targeted for control programs for bonytail include bluegill, green sunfish, redear sunfish, channel catfish, and northern pike (USFWS 2012d). Procedures have been developed that evaluate and revise stocking of nonnative fish species in the Upper Colorado Basin, with the purpose of minimizing

negative interactions between nonnative fishes and bonytail. Control programs involving the removal of sunfishes, channel catfish, and northern pike in bonytail habitat in the Upper Colorado River Basin have been implemented to reduce predation effects.

- Hybridization – There is evidence that hybridization has occurred in *Gila* species in the Colorado River system. The current levels of hybridization are not considered to be significant by themselves (USFWS 2002b). The only population where hybridization is suspected is in Cataract Canyon. However, the incidence and potential effects of hybridization on bonytail will be monitored as fish are released into the wild.
- Contaminants – Potential contaminants involving petroleum products, radionuclides, selenium, pesticides, and heavy metals such as mercury are considered risks to bonytail. Actions that have been proposed to reduce risks of contaminants include the review and evaluation of hazardous material spills and federal and state response plans and the requirement for emergency shut-off valves at new pipeline crossings (USFWS 2012d). The second action is now required as part of Section 7 consultations.

Recovery

A recovery plan was published for bonytail in 2002 (USFWS 2002b). The upper basin subunit is composed of the Green River and Upper Colorado Basin and the lower basin unit includes the mainstem and tributaries of the Colorado River from Lake Mead downstream to the southerly International Boundary with Mexico. The most recent recovery review in 2012 indicated that bonytail has not yet achieved demographic recovery goals that are indicative of a healthy, viable, and sustainable population level (USFWS 2012d). The review also concluded that the most meaningful threats to bonytail include habitat availability, protection from predation, and degraded water quality. The recovery review indicated a recovery priority of 5C. The numerical part of the priority rating means that there is a moderate degree of threat and a low degree of recovery potential at the species level taxonomically (USFWS 2012d). The "C" identifies the potential for conflicts between recovery actions and economic activities.

Bonytail will be considered eligible for downlisting from "endangered" to "threatened" and removal from ESA protection when all of the following conditions are met:

- Self-sustaining fish populations reach the required numbers in the areas of the Green and Upper Colorado river subbasins and the Lower Colorado River Basin, and a genetic refuge is established in the Lower Basin;
- Essential habitats, including required instream flows, are legally protected; and
- Other identifiable threats that could significantly affect the population are removed.

The criteria for downlisting and delisting are listed in **Table 6-3**.

Table 6-3 Criteria for Bonytail Downlisting and Delisting

Downlisting	Delisting
Over a 5-year period: • Maintain reestablished populations in the Green and Upper Colorado River subbasins, each with >4,400 adults • Maintain established genetic refuge[1] of adults in the Lower Colorado Basin • Maintain two reestablished populations in the Lower Colorado Basin, each >4,400 adults	For 3 years after downlisting: • Maintain reestablished populations in the Green and Upper Colorado River subbasins, each with >4,400 adults • Maintain established genetic refuge of adults in the Lower Colorado Basin • Maintain two reestablished populations in the Lower Colorado Basin, each >4,400 adults

[1] Genetic refuge is a group of fish that, as a whole, represent a substantial portion of the genetic variability of the species (USFWS 2013d).

The *Recovery Implementation Program for Endangered Fish Species in the Upper Colorado Basin (Recovery Program)* was established in 1994 to assist in recovery for bonytail and three other listed species in the Upper Colorado River Basin. Funding from the Recovery Program Actions that are being taken to recover the bonytail with a focus on the following actions:

- Managing water to provide adequate instream flows and habitat;
- Constructing fish passages and screens at major diversion dams to provide endangered fish access to their critical habitat;
- Restoring floodplain habitat;
- Monitoring fish population numbers; and
- Managing nonnative fishes (USFWS 2013d).

In addition to these actions, the Recovery Program works to reestablish naturally self-sustaining populations of bonytail through propagation and stocking (USFWS 2013d). The Recovery Program maximizes the genetic diversity of broodstock used to produce fish in hatcheries, which increases the likelihood that stocked fish will survive and reproduce in the wild. Bonytail are raised at two hatchery facilities, the J.W. Mumma Native Aquatic Species Restoration Facility in Alamosa, Colorado, and the Wahweep Fish Hatchery in Big Water, Utah. All bonytail for these hatcheries come from the USFWS's Dexter National Fish Hatchery and Technology Center in Dexter, New Mexico, which maintains the broodstock. Bonytail raised at these facilities are stocked in the Green and upper Colorado rivers in Colorado and Utah. Stocked fish have been recaptured in several locations within both river systems. Stocking efforts have expanded into floodplain wetlands to enhance bonytail growth and survival.

Assessment of Effects

Area of Analysis

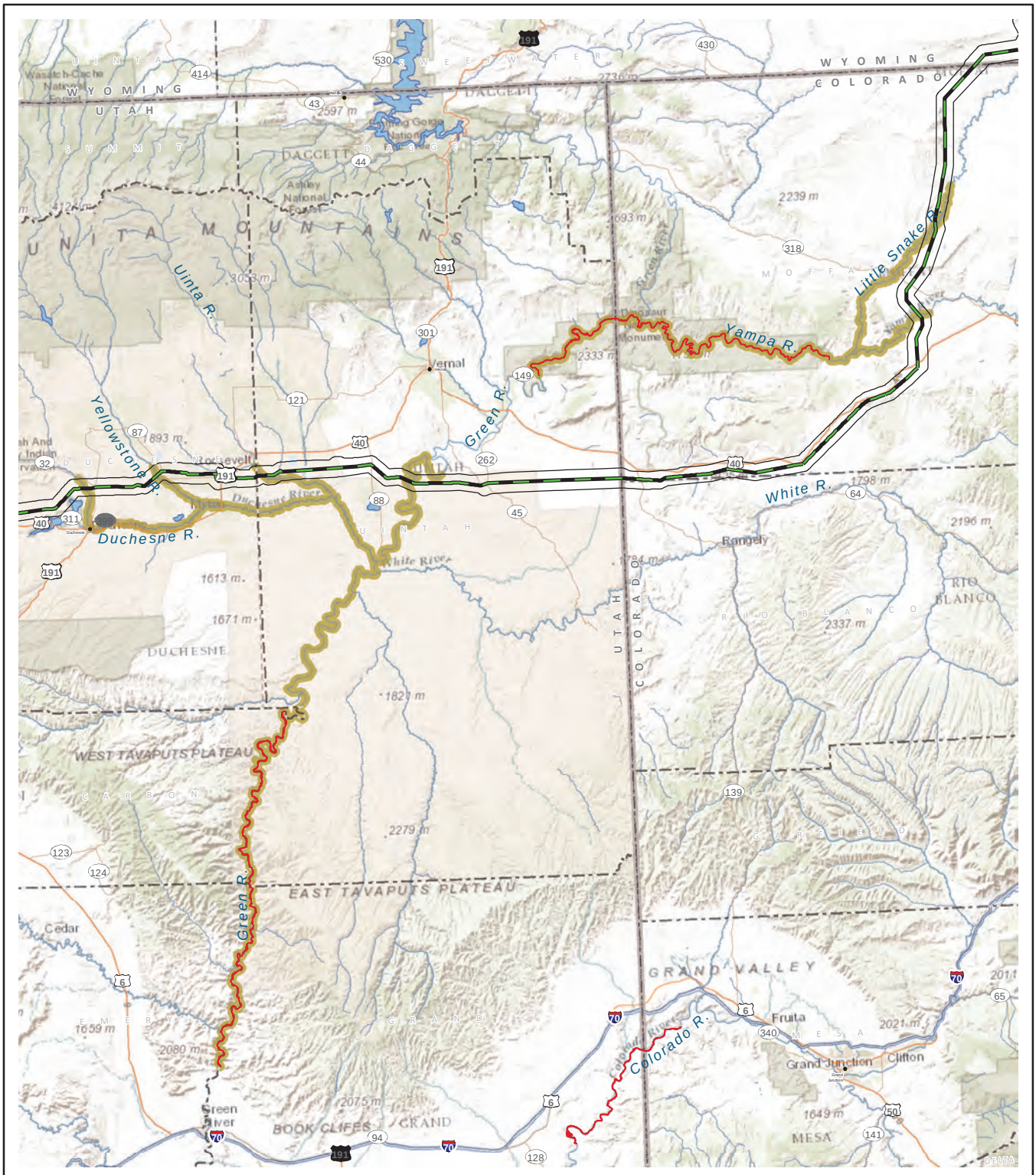
The analysis area for bonytail would include occupied and critical habitat located downstream of the potential points of water diversion to Lake Powell. The closest known critical habitat is located in the Yampa River and the Green River (Desolation and Gray canyons), which are approximately 19 and 22 miles, respectively, from the refined transmission corridor (**Figure 6-9**). The analysis area would exclude the refined transmission corridors and the potential disturbance area beyond the corridors, since there is no occupied or critical habitat that is crossed by the refined transmission corridor and the engineered alignment.

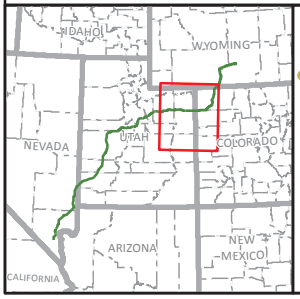
Conservation Measures

No additional protection measures are proposed for bonytail chub.

Direct and Indirect Effects

There would be no effects on bonytail chub or its critical habitat other than potential water depletions, since the closest occupied and critical habitat for this species are located approximately 19 and 22 miles downstream of the refined transmission corridors. There would be no alteration or loss of critical habitat for bonytail. In addition, any ground disturbance from construction or operation activities would not result in sediment or potential fuel spill effects on this species due to the considerable distance downstream to occupied or critical habitat.





- Proposed
- Action
- Analysis
- Bonytail and Humpback Chub Critical Habitat

TRANSWEST EXPRESS TRANSMISSION PROJECT

Figure 6-9
Areas of Analysis for
Bonytail and Humpback Chub

0 5 10 20 Miles
0 5 10 20 km
1:1,250,000

N

Western AREA POWER ADMINISTRATION

Exported On: 2/19/2015

K:\Projects_4\TransWestExpress\12907_003_Transwest_Express\Figures\DocumentFigures\2015_BA_v2\Aquatic\Fig_6_09_BonytailAndHumpbackChubs.mxd

There could be potential water depletions in the Upper Colorado Basin from construction water use for dust control and concrete preparation. Water use for this project would be obtained from municipal sources, commercial sources, or a temporary water use agreement with landowners holding existing water rights. Since specific water sources have not been identified at this time, the USFWS cannot determine if the water sources have been through Section 7 consultation. Therefore, the USFWS assumes that all of the construction water use would be new depletions. This action would represent a consumptive water use from the Upper Colorado Basin of 109 acre-feet for Region I and 110 acre-feet for Region II during a 3-year time frame when water would be used for construction purposes. The total estimated depletion for the Upper Colorado River Basin would be 219 acre-feet. This volume represents an average annual depletion of 73 acre-feet per year for the 3-year construction period. New depletions represent an adverse effect on endangered fish species in the Upper Colorado River.

An Applicant committed design feature, TWE-2, ensures that applicable environmental regulations would be followed including requirements for federally listed species under the ESA and Section 7 consultation (Chapter 3.0).

As part of flow requirements for the four endangered fish species in the Upper Colorado River Basin (Colorado pikeminnow, humpback chub, bonytail, and razorback sucker), water use for projects must comply with the *Recovery Implementation Program for Endangered Fish Species in the Upper Colorado Basin* (Recovery Plan) (USFWS 2013d). To ensure the survival and recovery of the four endangered fish species in the Upper Colorado River, water users with depletions are required to make a one-time payment to the Recovery Plan. In 1995, an intra-USFWS Opinion determined that the fee for depletions of less than 100 acre-feet (annual average) would no longer be required. The depletion fee is established each fiscal year after it has been determined that the Recovery Program is making sufficient progress toward recovery of the endangered fish species regarding ESA compliance for water withdrawals. In 2015, the fee for Colorado River Basin depletions is $20.54 per acre-foot.

The Recovery Plan would be effective in minimizing effects of potential water depletions on bonytail habitat. However, if new water sources are used that have connections to surface flows in the Upper Colorado River Basin and they have not been previously consulted on by the USFWS, there could be a small effect on bonytail habitat. It is not possible to quantify the net effect other than relative terms, since specific water sources have not been identified at this time.

Cumulative Effects

No reasonably foreseeable non-federal future actions have been identified within the vicinity of the Project action area. However, it is reasonable to expect that future water depletions could occur in the Upper Colorado River as a result of non-federal actions such as agricultural or land development. The Recovery Plan was established to mitigate the effects of water depletions on federally endangered fish species in the Upper Colorado River Basin.

Determination

Effect on the Species: The Proposed Action *may affect, and is likely to adversely affect* the bonytail as a result of potential water depletions. Construction and operation activities would not directly affect bonytail, since there is no occupied habitat at the corridor crossings.

Effect on Critical Habitat: The Proposed Action *may affect, and is likely to adversely affect* designated critical habitat as a result of potential water depletions. Construction and operation activities would not directly affect bonytail, since there is no critical habitat within the corridor crossings.

Rationale: Any water depletions in the Upper Colorado River Basin may affect occupied and critical habitat for the four federally endangered fish species. However, the Recovery Program would provide funds to assist in reducing the effects of flow reductions on the four federally endangered fish species in the Upper Colorado River Basin. The magnitude of the water depletion would depend on the selected

water sources and whether they are connected to surface flows in the Upper Colorado River Basin and if they have been consulted on previously by the USFWS. Specific water sources will be determined at a later phase of the Project.

6.1.4.2 Colorado Pikeminnow (Endangered)

Environmental Baseline

Conservation Status

Colorado pikeminnow (originally named as Colorado squawfish) was listed as endangered on March 11, 1967 (32 FR 4001). With the passage of the ESA in 1973, this fish species retained its endangered status. On March 21, 1994, the USFWS designated six reaches of the Colorado River system as critical habitat for the species (59 FR 13374). In addition, two reintroduced Colorado pikeminnow populations have been designated as EXP/NE in the Verde and Salt rivers in Arizona under 10(j) of the ESA (50 FR 30188). A recovery plan was published for Colorado pikeminnow in 2002 (USFWS 2002c).

Abundance of Colorado pikeminnow varies in the three occupied subbasins of the Upper Colorado River Basin. Based on abundance information provided in the recovery goals document (USFWS 2002b), estimates for the three subbasins were 6,000 to 8,000 in the Green River, 600 to 900 in the Colorado River, and 19 to 50 in the San Juan River. The wild population in the San Juan River subbasin, which is isolated from the remainder of the upper Colorado River Basin by Lake Powell, is relatively small (Bestgen et al. 2010). Approximately 983 Colorado pikeminnow have been stocked in the San Juan River from 2004 through 2008. Recent estimates of Colorado pikeminnow in the Colorado River indicated an upward trend, with adult abundance in the 1992 to 2005 period increasing from about 200 to nearly 890 adult fish (Osmundson and White 2009; USFWS 2011b). In years when surveys were conducted, the population estimate was above 700 in 1993, 2000, and 2005.

Recent population modeling estimated a 50 percent increase in the abundance of the entire Green River population and a 70 percent increase compared to the 2003 population estimate (USFWS 2011b). The USFWS considers the Green River population to be self-sustaining. Since 2007 the population estimate has exceeded to minimum viable population level.

Life History and Habitat Association

The entire population of the Colorado pikeminnow has been reduced to three recovery subunits in the Upper Colorado River Basin: the Green River, the Upper Colorado River, and the San Juan River subbasins. Colorado pikeminnow occurs in the following rivers systems associated with these three subbasins: Green River subbasin (Green, Yampa, Little Snake, White, Price, and Duchesne), Upper Colorado subbasin (Upper Colorado River, Gunnison, and Dolores), and San Juan subbasin (San Juan River).

Habitat requirements of Colorado pikeminnow vary depending on the life stage and time of year. Young-of-the-year (YOY) and juveniles prefer shallow backwaters, while adults use pools, eddies, and deep runs that are maintained by high spring flows (USFWS 2002c). Habitat that was the focus of sampling efforts for Colorado pikeminnow in the Green River during low flow periods included small eddies and pools in nearshore areas and near sand and gravel bars in mid-channel areas (Bestgen et al. 2010). During peak runoff in the spring and early summer, fish usually move into backwater areas of flooded riparian zones to avoid swift velocities, feed, and prepare for the upcoming spawning period. Survey efforts for Colorado pikeminnow in the Green River during high flow periods consisted of nearshore areas, flooded tributary mouths, canyon washes, and large backwater areas (Bestgen et al. 2010). Adults are highly mobile during the spawning period, which occurs after peak runoff in mid-June to mid-August. Movements have been documented up to 400 miles and involved multiple rivers within the Upper Colorado River Basin (e.g., Green and Colorado rivers) (Osmundson and White 2009).

Six reaches have been designated as critical habitat for Colorado pikeminnow in the Colorado River system, including portions of the Colorado, Green, Yampa, White, and San Juan rivers in the Upper Basin and the Colorado River in the Lower Basin, with an overall total of 1,148 river miles (59 FR 13374-13400). Critical habitat consists of the 100-year floodplain in the 6 reaches listed above where constituent elements including water, physical habitat, and biological requirements are present.

Colorado pikeminnow is a warmwater species that requires relatively warm water (18º to 24ºC) for spawning, egg incubation, and survival of young (USFWS 2002c). This species is a broadcast spawner that scatters adhesive eggs over cobble substrate where incubation occurs in interstitial spaces. Newly hatched larvae develop in approximately 3 to 15 days and then drift as late-stage larvae at distances from 50 to 120 miles to nursery areas in backwaters. Subadult Colorado pikeminnow (age 4 and older) tend to move back upstream as they mature. Subadults and adults overwinter in backwater areas. Adult Colorado pikeminnow remain in their home ranges during the fall, winter, and spring. During the summer spawning period, adults can migrate considerable distances to spawning areas. Round-trip movements of up to 590 miles have been reported in the Upper Colorado River (Irving and Modde 2000, as cited in USFWS 2002b).

Threats

Threats to Colorado pikeminnow are identified in the recovery goals document (USFWS 2002c). Threats to Colorado pikeminnow are the same as discussed for the bonytail in Section 6.1.4.1.

Recovery

A recovery plan for this species was published in 2002 (USFWS 2002c). As part of the recovery process, 5-year reviews have been conducted for this species to evaluate whether the status of the species has changed since its original listing in 1967. The most recent recovery review in 2011 indicated a recovery priority of 8C. The numerical part of the priority rating means that there is a moderate degree of threat and a high degree of recovery potential at the species level taxonomically (USFWS 2011b). The “C” identifies the potential for conflicts between recovery actions and economic activities. Recovery of the species is considered necessary only in the Upper Colorado Basin; historic populations for this species in the Lower Colorado Basin are extirpated and the only extant population is the EXP/NE in the Salt and Verde rivers.

Colorado pikeminnow will be considered eligible for downlisting from “endangered” to “threatened” and removal from ESA protection when all of the following conditions are met:

- Self-sustaining fish populations reach the required numbers in the areas of the Green, Upper Colorado River, and San Juan River subbasins;
- Essential habitats, including required instream flows, are legally protected; and
- Other identifiable threats that could significantly affect the population are removed.

The criteria for downlisting and delisting are listed in **Table 6-4**.

Table 6-4 Criteria for Colorado Pikeminnow Downlisting and Delisting

Downlisting	Delisting
Over a 5-year period: • A genetically and demographically viable, self-sustaining population is maintained in the Green River subbasin with a population point estimate exceeding 2,600 adults; • A self-sustaining population of at least 700 adults in the Upper Colorado River subbasin;	For 7 years after downlisting: • A genetically and demographically viable, self-sustaining population is maintained in the Green River subbasin with a population point estimate exceeding 2,600 adults; • A self-sustaining population of at least 1,000 adults in the Green River subbasin, 700 adults in the

Table 6-4 Criteria for Colorado Pikeminnow Downlisting and Delisting

Downlisting	Delisting
• A target number of 1,000 age-5^{+} fish is achieved in the San Juan River subbasin; and • Certain site-specific management tasks to minimize or remove threats have been identified, developed, and implemented.	Upper Colorado River subbasin, or 800 adults in the San Juan River subbasin; and • Certain site-specific management tasks to minimize or remove threats have been identified, developed, and implemented.

Assessment of Effects

Area of Analysis

The analysis area for Colorado pikeminnow would include occupied and critical habitat crossed by the refined transmission corridors and the potential disturbance area beyond the refined transmission corridors plus an approximate 1-mile downstream segment from the ROW crossings to address direct and indirect effects of the Proposed Action (**Figure 6-10**). The refined transmission corridors and engineered alignments cross occupied habitat for Colorado pikeminnow in the Yampa and Little Snake rivers. Occupied habitat also is located downstream of the transmission line corridor and engineered alignment in the Colorado River and tributaries near the confluence with the Colorado, Price, and White rivers. The only two known spawning sites for the species are located downstream of the refined transmission corridor and engineered alignment at Three Fords Canyon in the Gray Canyon area of the Green River (Carbon and Uintah counties, Utah) and the lower 20 miles of the Yampa River (Moffatt County, Colorado).

Critical habitat for Colorado pikeminnow is crossed by the refined transmission corridor and engineered alignment in the Green and Yampa rivers. The critical habitat reaches that are crossed as described as follows (59 FR 13398):

- Colorado (Moffat County) – The Yampa River and its 100-year floodplain from SH-394 to the confluence with the Green River.
- Utah (Uintah County) and Colorado (Moffatt County) – The Green River and its 100-year floodplain from the confluence with the Yampa River to the confluence with the Colorado River.

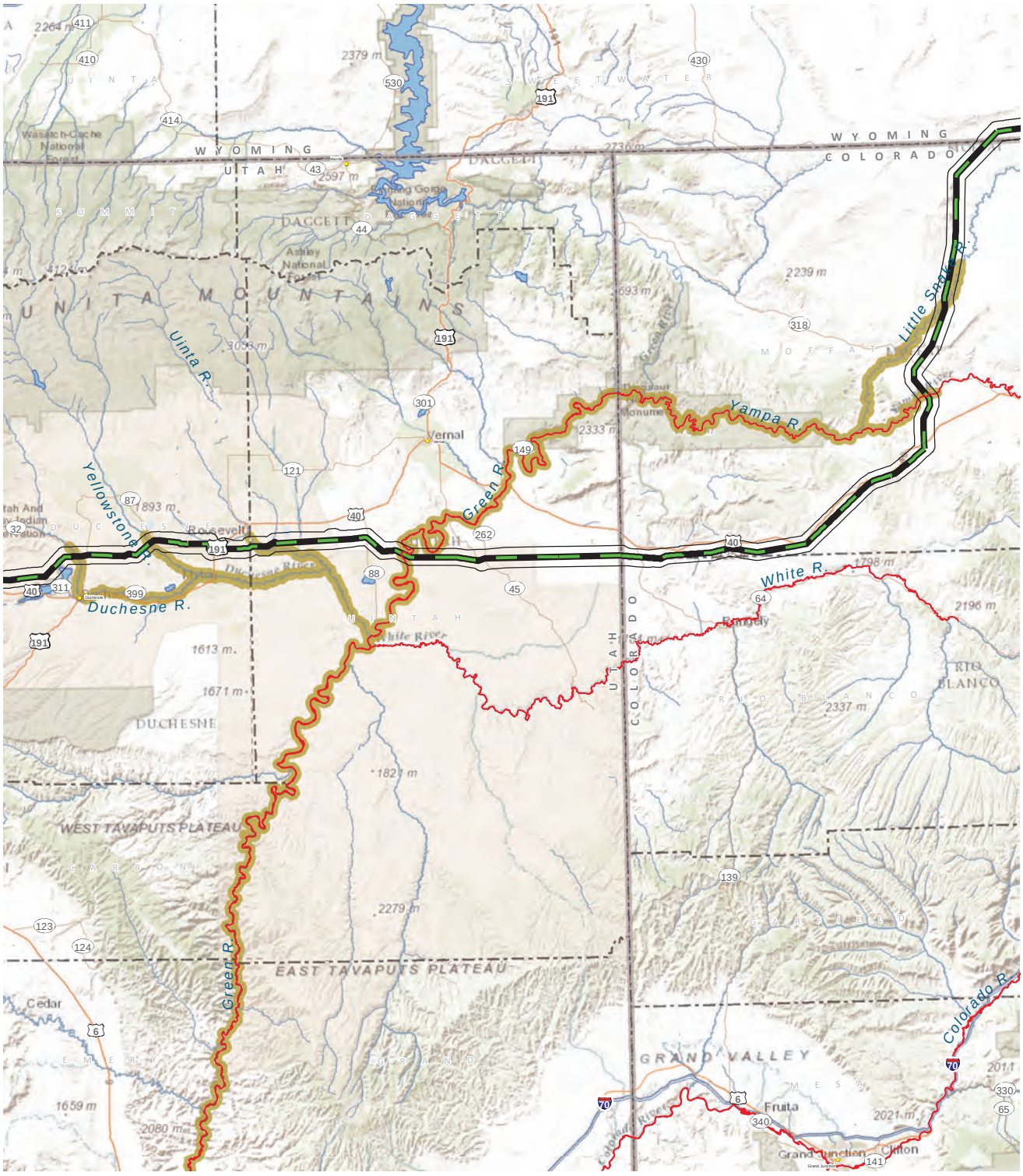
The analysis area for Colorado pikeminnow also would include occupied and critical habitat located downstream of the potential points of water diversion to Lake Powell.

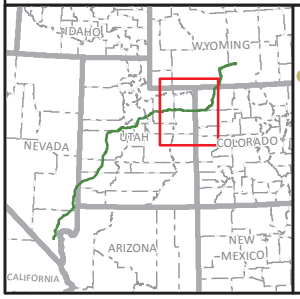
Conservation Measures

Impacts to Colorado pikeminnow would be minimized through implementation of the BMPs, design features, and conservation measures referenced or described in Chapter 3.0:

- Applicable BMPs ECO-1 and ECO-4.
- Applicant-committed conservation measures and design features: TWE-2, TWE-29, and TWE-31.
- Conservation measures: **SSS-1** and **WR-3**.

K:\Projects_4\TransWestExpress\12907_003_Transwest_Express\Figures\DocumentFigures\2015_BA_v2\Aquatic\Fig_6_10_ColoradoPikeminnow.mxd





- Proposed Action
- Action Area
- Analysis Area
- Colorado Pikeminnow Critical Habitat

TRANSWEST EXPRESS TRANSMISSION PROJECT

Figure 6-10
Area of Analysis for
Colorado Pikeminnow

0 5 10 20 Miles
0 5 10 20 km
1:1,250,000

N

Western Area Power Administration

Exported On: 2/19/2015

The following additional conservation measures are proposed to avoid or reduce effects of the Proposed Action on Colorado pikeminnow:

SSS-2 (Avoidance of Water Withdrawal and Entrainment/Impingement Effects for Federally Listed Fish Species): Where critical habitat for the Colorado River federally endangered fish species cannot be avoided as water sources for construction purposes, TransWest would be required to obtain approval from the USFWS and state or federal agencies responsible for managing the land and critical habitat areas. Agency approval would ensure that water withdrawal methods would avoid or minimize entrainment or impingement effects to early life stages of endangered fish species. Requirements for water pumping in critical habitat areas would include: 1) avoidance of pumping between approximately April 1 through August 31, with specific dates dependent upon the water year; 2) intake hoses would be screened with 3/32-inch mesh size; 3) intake velocity would not exceed 0.33 feet/second in an area where larval stages of the federally endangered fish may be present; and 4) pumping from off-channel locations (i.e., no connection to the river during high spring flows) would use an infiltration gallery constructed in a USFWS-approved location. Additional guidance on pumping methodology is provided in the NMFS's (1997) document entitled Fish Screening Criteria for Anadromous Salmonids.

SSS-4 (No Permanent Structures or New Roads in Critical Habitat for Federally Listed Fish Species): No permanent structures or new roads would be constructed in critical habitat for federally endangered fish species. Any temporary disturbance to soils in the 100-year floodplain within critical habitat would be minimized to the extent possible and restoration would be completed to maintain existing conditions. TransWest would avoid siting temporary facilities such as staging areas and helicopter pads in the 100-year floodplain that is designated critical habitat. Additionally, TransWest would avoid temporary river crossings by vehicles within designated critical habitat.

Direct and Indirect Effects

The 250-foot-wide transmission line ROW would cross occupied and critical habitat for Colorado pikeminnow in the Yampa and Green rivers. Critical habitat for Colorado pikeminnow consists of the 100-year floodplain in these rivers. The counties associated by these ROW crossings include Moffat County, Colorado for the Yampa River; and Uintah County, Utah, for the Green River. In total, 2 acres of Colorado pikeminnow critical habitat would be crossed, which consists of 1 acre in the Yampa River and 1 acre in the Green River. Implementation of conservation measure **SSS-4** described above would minimize impacts to Colorado pikeminnow associated with the loss or alteration of critical habitat due placement of Project facilities and/or roads in these areas.

The 250-foot-wide transmission line ROW also would cross one other stream that contains Colorado pikeminnow: Little Snake River (noncritical habitat). The pikeminnow occurrence in the Little Snake River is located in the lower 1-mile section near the confluence with the Yampa River. Potential effects on Colorado pikeminnow could include loss or alteration of noncritical habitat, if ground disturbance occurs within the floodplain at the Little Snake River ROW crossing.

Implementation of conservation measure **SSS-2** would avoid impacts associated with potential entrainment or impingement of early life stages of Colorado pikeminnow, if water is withdrawn for construction purposes (i.e., dust control or concrete foundations) from critical habitat that supports spawning or nursery areas.

Indirect effects on Colorado pikeminnow could include sedimentation, riparian removal, and potential fuel spill risks. These effects could occur within the 250-foot-wide transmission line ROW and the potential disturbance area beyond the refined transmission corridor that could be disturbed by access roads and temporary work areas. Sediment input and potential fuel spills would result in adverse water quality conditions where the disturbance areas drain into the Yampa, Green, and White rivers. The downstream extent would depend on flow conditions, channel morphology, stream gradient, and the presence of pools or channel structures that could trap sediment. Any riparian vegetation removal would be limited to

a relatively small section of the river crossed by the 250-foot-wide transmission line ROW. These potential impacts would be avoided or minimized through implementation of BMPs, Applicant-committed mitigation measures and design features and the conservation measures described above.

There could be potential water depletions in the Upper Colorado Basin from construction water use for dust control and concrete preparation. Water use for this project would be obtained from municipal sources, commercial sources, or a temporary water use agreement with landowners holding existing water rights. Since specific water sources have not been identified at this time, the USFWS cannot determine if the water sources have been through Section 7 consultation. Therefore, the USFWS assumes that all of the construction water use would be new depletions. This action would represent a consumptive water use from the Upper Colorado Basin of 109 acre-feet for Region I and 110 acre-feet for Region II during a 3-year time frame when water would be used for construction purposes. The total estimated depletion for the Upper Colorado River Basin would be 219 acre-feet. This volume represents an average annual depletion of 73 acre-feet per year for the 3-year construction period. New depletions represent an adverse effect on endangered fish species in the Upper Colorado River.

As part of flow requirements for the four endangered fish species in the Upper Colorado River Basin (Colorado pikeminnow, humpback chub, bonytail, and razorback sucker), water use for projects must comply with the Recovery Plan (USFWS 2013d). Details on how the Recovery plan would be applied to water depletions are discussed in Section 6.1.4.1. The Recovery Plan would be effective in minimizing effects of potential water depletions on Colorado pikeminnow habitat. However, if new water sources are used that have connections to surface flows in the Upper Colorado River Basin and they have not been previously consulted on by the USFWS, there could be a small residual effect on Colorado pikeminnow habitat. It is not possible to quantify the net effect other than relative terms, since specific water sources have not been identified at this time.

Cumulative Effects

No reasonably foreseeable non-federal future actions have been identified within the vicinity of the Project action area. However, it is reasonable to expect that future water depletions could occur in the Upper Colorado River as a result of non-federal actions such as agricultural or land development. The Recovery Plan was established to mitigate the effects of water depletions on federally endangered fish species in the Upper Colorado River Basin.

Determination

Effect on the Species: The Proposed Action *may affect, and is likely to adversely affect* the Colorado pikeminnow as a result of potential water depletions. Construction and operation activities would not directly affect Colorado pikeminnow, since there is a BLM management requirement and an additional conservation measure that would minimize ground disturbance within the 100-year floodplain. The Herbicide Use Plan would minimize potential effects of maintenance activities on Colorado pikeminnow.

Effect on Critical Habitat: The Proposed Action *may affect, and is likely to adversely affect* designated critical habitat as a result of potential water depletions. Construction and operation activities would not directly affect Colorado pikeminnow, since there would be no ground disturbance allowed in the 100-year floodplain.

Rationale: Any water depletions in the Upper Colorado River Basin may affect occupied and critical habitat for the four federally endangered fish species. However, the Recovery Program would provide funds to assist in reducing the effects of flow reductions on the four federally endangered fish species in the Upper Colorado River Basin. The magnitude of the water depletion would depend on the selected water sources and whether they are connected to surface flows in the Upper Colorado River Basin and if they have been consulted on previously by the USFWS. Specific water sources will be determined at a later phase of the Project.

6.1.4.3 Humpback Chub (Endangered)

Environmental Baseline

Conservation Status

The date (March 11, 1967) and listing status (endangered) for listing humpback chub is the same as discussed for Colorado pikeminnow. On March 21, 1994, the USFWS designated seven reaches of the Colorado River system as critical habitat for humpback chub (59 FR 13374). The initial recovery plan for humpback chub was published in 1990 and amended in 2002 (USFWS 2002d).

The historic abundance of humpback chub is unknown, but it is estimated that the species currently occupies approximately 68 percent of its historic habitat (USFWS 2011c). Currently, six populations of humpback chub are known to exist: 1) Black Rocks, Colorado River, Colorado; 2) Westwater Canyon, Colorado River, Utah; 3) Yampa Canyon, Colorado; 4) Desolation/Gray Canyons, Green River, Utah; 5) Cataract Canyon, Colorado River, Colorado; and 6) mainstem Colorado River in Marble and Grand canyons. A significant population decline has been reported for Black Rocks, Westwater Canyon, and Desolation/Gray Canyons since 1996, with the estimated number of adults less than 500 in Black Rocks, less than 2,000 in Westwater Canyon, and less than 10 in Desolation/Gray Canyons (USFWS 2011c). Populations in the Yampa River and Cataract Canyon are too small to monitor through mark-recapture analysis. The Upper Colorado River populations are not self-sustaining at this time. The population trend has shown a decrease in the past 10 to 15 years.

The largest known population occurs in the Lower Colorado River Basin in the Grand Canyon, with the highest abundance in the Little Colorado River confluence with the Colorado River. The abundance of this population is estimated to range from approximately 6,000 to 10,000. This population is regarded as self-sustaining and it has shown an increasing trend from 2001 through 2008 (USFWS 2011c).

Life History and Habitat Association

Currently, there are six self-sustaining populations of humpback chub. Five occur in the Upper Colorado RU and one in the Lower Colorado RU. The Upper Colorado RU consists of populations in the Colorado River (Black Rocks and Westwater Canyon in Utah and Cataract Canyon in Colorado), one population in the Yampa River (Yampa Canyon in Colorado), and in the Green River (Desolation/Gray Canyons in Utah). The only population in the Lower Basin RU occurs in the mainstem portion of the Colorado River in Marble and Grand Canyons and the Little Colorado River. Each of these populations consists of a discrete reproducing group of fish, with independent stock-recruitment dynamics and separate geographic areas (USFWS 2002d).

Humpback chub mainly occur in river canyons where they utilize a variety of habitats including deep pools, eddies, upwells near boulders, and areas near steep cliff faces. As young humpback chub mature, they shift toward deeper and swifter offshore habitats (USFWS 2002d). In Westwater Canyon, small fish less than 40 millimeters (mm) in total length (TL) used low-velocity areas such as backwaters and shorelines. Later in the summer and fall when fish were 40 to 50 mm TL, their habitat use shifted towards higher-velocity habitats. In the Yampa and Green rivers, juvenile and adults used habitats consisting of rocky shoreline runs and small shoreline eddies.

Seven reaches have been designated as critical habitat for humpback chub in the Colorado River system, including portions of the Colorado, Green, and Yampa rivers in the Upper Basin and portions of the Colorado River and Little Colorado River in the Lower Basin, with an overall total of 379 river miles (59 FR 13374-13400). Critical habitat consists of the 100-year floodplain in the seven reaches where constituent elements including water, physical habitat, and biological requirements are present.

Humpback chub are broadcast spawners with a relatively low fecundity rate compared to other minnow species of similar size (USFWS 2002d). Spawning primarily occurs in March through May in the lower basin and during April through June in the upper basin. Spawning temperatures typically range from

16ºC to 22ºC. The presence of juveniles with a range of sizes indicates that successful spawning occurs in all or at least portions of all six populations (USFWS 2002d). Humpback chub moves substantially less than other native Colorado River fishes.

Threats

Threats to humpback chub include streamflow regulation, habitat modification, predation by nonnative fish species, parasitism, hybridization with other *Gila* species, and pesticides and pollutants (USFWS 2002d). Most of these factors were threat topics would be the same as discussed for bonytail. Information specific to humpback chub is summarized below from USFWS (2002d).

- Parasitism – Diseases and parasitism have been evaluated for the humpback chub in the upper and lower basins. Diseases and parasitism are not considered threats in the upper basin. However, declines in the humpback population in the lower basin have been identified as a result of infestation by the Asian tapeworm.
- Hybridization – Humpback cub, bonytail, and roundtail chub are sympatric species in the Colorado River mainstem, with substantial evidence of introgressive hybridization. Hybridization is evident in all of the upper basin populations, with the highest levels shown in Desolation/Gray canyons.
- Pesticides and Pollutants – Pollutants of concern for humpback chub include pesticides from agricultural applications, petroleum products, heavy metals, nonmetalics such as selenium, and radionuclides. Threats have been identified in in the following populations: Black Rocks and Westwater Canyon (spills from the Denver and Rio Grande Railroad), Yampa Canyon (pipeline crossings and agricultural runoff), and the Little Colorado River (road crossings/truck traffic).

Recovery

A recovery plan for humpback chub was first published in 1990 and then amended in 2002 (USFWS 2002d). Five-year reviews of the recovery goals were initiated in 2007 for the humpback chub and the other three Colorado River system endangered fish species (72 FR 19549-19551). The results of the first 5-year review for humpback chub are not yet available.

Seven populations are identified in the recovery plan for humpback chub: 1) Black Rocks, Colorado River, Colorado; 2) Westwater Canyon, Colorado River, Utah; 3) Yampa Canyon, Colorado; 4) Desolation/Gray canyons, Green River, Utah; 5) Cataract Canyon, Colorado River, Utah; 6) the lower Colorado River, Arizona; and 7) the Little Colorado River, Arizona (USFWS 2002d). For the purposes of recovery goals for humpback chub, the upper and lower basins are divided at the Glen Canyon Dam in Arizona. Separate objective, measurable recovery criteria were developed for each of the RUs (i.e., the upper basin including the Green and upper Colorado River subbasins; and the lower basin including the mainstem of the Colorado River and its tributaries downstream to the Lake Mead National Recreation Area) for the purpose of addressing the unique threats and using site-specific management actions necessary to minimize or remove these threats. The RUs encompass three management areas under three separate recovery or conservation programs: Upper Colorado River Endangered Fish Recovery Program, the Glen Canyon Dam Adaptive Management Program, and the Lower Colorado River Multi-Species Conservation Program.

Humpback chub will be considered eligible for downlisting from “endangered” to “threatened” and from removal from ESA protection when all of the following conditions are met:

- Maintain six self-sustaining populations;
- Essential habitats, including required instream flows, are legally protected; and
- Other identifiable threats that could significantly affect the population are removed.

The criteria for downlisting and delisting are listed in **Table 6-5**.

Table 6-5 Criteria for Humpback Chub Downlisting and Delisting

Downlisting	Delisting
Over a 5-year monitoring period: • Maintain six populations with no net loss • Establish one core population in the Upper Colorado River Basin with >2,100 adults • Establish one core population in the Lower Colorado River Basin with >2,100 adults	For 3 years after downlisting: • Maintain six populations with no net loss • Establish one core population in the Upper Colorado River Basin with >2,100 adults • Establish one core population in the Lower Colorado River Basin with >2,100 adults

Assessment of Effects

Area of Analysis

The analysis area for humpback chub would include occupied and critical habitat located downstream of the potential points of water diversion to Lake Powell. The closest known critical habitat is located in the Yampa and Green rivers, which are approximately 19 and 22 miles, respectively, from the closest refined transmission corridor (**Figure 6-9**). Occupied and critical habitat exists downstream of the refined transmission corridor and engineered alignment in the Colorado, Yampa, and Green rivers. The analysis area would exclude the refined transmission corridors and the potential disturbance area beyond the corridors, since there is no occupied or critical habitat that is crossed by the refined transmission corridor and the engineered alignment.

Conservation Measures

An Applicant committed design feature, TWE-2, ensures that applicable environmental regulations would be followed including requirements for federally listed species under the ESA and Section 7 consultation (Chapter 3.0). No additional protection measures are proposed for humpback chub.

Direct and Indirect Effects

There would be no effects on humpback chub or its critical habitat other than potential water depletions, since the closest occupied and critical habitat for this species are located approximately 19 and 22 miles downstream of the refined transmission corridors. There would be no alteration or loss of critical habitat for humpback chub. In addition, any ground disturbance by construction or operation activities would not result in sediment or potential fuel spill effects on this species due to the considerable distance downstream to occupied or critical habitat.

There could be potential water depletions in the Upper Colorado Basin from construction water use for dust control and concrete preparation. Water use for this project would be obtained from municipal sources, commercial sources, or a temporary water use agreement with landowners holding existing water rights. Since specific water sources have not been identified at this time, the USFWS cannot determine if the water sources have been through Section 7 consultation. Therefore, the USFWS assumes that all of the construction water use would be new depletions. This action would represent a consumptive water use from the Upper Colorado Basin of 109 acre-feet for Region I and 110 acre-feet for Region II during a 3-year time frame when water would be used for construction purposes. The total estimated depletion for the Upper Colorado River Basin would be 219 acre-feet. This volume represents an average annual depletion of 73 acre-feet per year for the 3-year construction period. New depletions represent an adverse effect on endangered fish species in the Upper Colorado River.

As part of flow requirements for the four endangered fish species in the Upper Colorado River Basin (Colorado pikeminnow, humpback chub, bonytail, and razorback sucker), water use for projects must comply with the Recovery Plan (USFWS 2013d). Details on how the Recovery plan would be applied to

water depletions are discussed in Section 6.1.4.1. The Recovery Plan would be effective in minimizing effects of potential water depletions on humpback chub habitat. However, if new water sources are used that have connections to surface flows in the Upper Colorado River Basin and they have not been previously consulted on by the USFWS, there could be a small net residual effect on humpback chub habitat. It is not possible to quantify the net effect other than relative terms, since specific water sources have not been identified at this time.

Cumulative Effects

No reasonably foreseeable non-federal future actions have been identified within the vicinity of the Project action area. However, it is reasonable to expect that future water depletions could occur in the Upper Colorado River as a result of non-federal actions such as agricultural or land development. The Recovery Plan was established to mitigate the effects of water depletions on federally endangered fish species in the Upper Colorado River Basin.

Determination

Effect on the Species: The Proposed Action *may affect, and is likely to adversely affect* the humpback chub as a result of potential water depletions. Construction and operation activities would not directly affect humpback chub, since there is no occupied habitat at the refined transmission corridor crossings.

Effect on Critical Habitat: The Proposed Action *may affect, and is likely to adversely affect* designated critical habitat as a result of potential water depletions. Construction and operation activities would not directly affect humpback chub critical habitat, since none is located within the corridor crossings.

Rationale: Any water depletions in the Upper Colorado River Basin may affect occupied and critical habitat for the four federally endangered fish species. However, the Recovery Program would provide funds to assist in reducing the effects of flow reductions on the four federally endangered fish species in the Upper Colorado River Basin. The magnitude of the water depletion would depend on the selected water sources and whether they are connected to surface flows in the Upper Colorado River Basin and if they have been consulted on previously by the USFWS. Specific water sources will be determined at a later phase of the Project.

6.1.4.4 June Sucker (Endangered)

Environmental Baseline

Conservation Status

The June sucker was federally listed in 1986 (51 FR 10851-10857). Critical habitat was designated for June sucker in the lower portion of the Provo River above its confluence with Utah Lake on March 31, 1986 (51 FR 10851-10857). A recovery plan was finalized for the species in 1999, with actions being implemented from 1995 through 2007 (June Sucker Recovery Implementation Team 2012a, 1999).

The population trend for wild June sucker has been in decline. Historically, it is estimated that that June sucker numbers in Utah Lake may have been in the millions. At the time of its listing in 1986, the wild population number for June sucker was estimated to be less than 1,000 (Andersen et al. 2006). More recent estimates of wild June sucker in the late 1990s were close to 300 individuals (NatureServe 2013b). The current population is estimated to be fewer than 1,000 individuals with exact numbers unknown (June Sucker Recovery Implementation Program 2014). As part of the efforts to recover the species, June sucker is reared in hatcheries for release into Utah Lake. As of 2012, approximately 440,012 hatchery reared June sucker have been stocked in Utah Lake (UDWR 2013). Although June sucker numbers have increased due to stocking, larvae and juvenile life stages are not successfully surviving as desired due to a lack of suitable nursery habitat and predation by nonnative fish species.

Life History and Habitat Association

June sucker is endemic to Utah Lake in Utah. The lake is a relatively large and shallow lake with slightly saline, turbid, and eutrophic conditions. In general, June sucker uses all areas of the lake (June Sucker Recovery Implementation Team 1999). However, survey efforts have captured most of the suckers in Provo Bay and shoreline areas in Utah Lake. Riverine habitat used by spawning June suckers is described below in the *Life History* subsection.

The lower 4.9 miles of the Provo River was designated as critical habitat for the June sucker in 1986 (51 FR 10851-10857). The upper limit of the critical habitat area is defined as the Columbia Lane (Tanner Race) diversion with the lower end being the confluence with Utah Lake. Known constituent elements of June sucker critical habitat include 1 to 3 feet of high quality water constantly flowing over a clean, unsilted gravel substrate. The Spanish Fork River is not included as part of the critical habitat designation.

June sucker uses the lower portion of the Provo River for spawning and early life stage development. June sucker also spawns intermittently in the lower portion of the Spanish Fork River, a tributary to Utah Lake (Defreese 2014). June sucker adults leave Utah Lake and swim up the Provo River in April through June of each year (UDWR 2014). The area for spawning in the Provo River is limited to the lower three miles in most years due to an impassable irrigation diversion (June Sucker Recovery Implementation Program 2014). In very wet years, fish can migrate above the irrigation diversion and have access to an additional 1.9 miles of the river. Spawning occurs in shallow riffles over gravel or rock substrate at depths ranging from approximately 1 to 3 feet and velocities from 0.2 to 3.2 feet/second (June Sucker Recovery Implementation Program 2014; USFWS 1999). In the Provo River, June sucker larvae emerge from the gravel soon after hatching and drift downstream. Adult June sucker return to Utah Lake soon after spawning.

Threats

Threats to June sucker include habitat modification, water quality changes, and predation competition by nonnative fish species (USFWS 1999; 51 FR: 10851-10857), as summarized below.

- Habitat Modification – The main threats to habitat alteration have resulted from water diversion for irrigation, municipal, and industrial purposes. In addition, habitat has been modified from the operation of upstream impoundments such as the Central Utah Project.
- Water Quality – Human development in the drainage area surrounding Utah Lake has increased inflow of warm water, sediment input, nutrients, and industrial residues.
- Predation and Competition from Nonnative Fish – The introduction of nonnative fish species such as white bass, carp, channel catfish, and walleye has resulted in predation and completion with June sucker. These factors are considered a threat to the survival of June sucker.

Recovery

A recovery plan was finalized for this species in 1999 (June Sucker Recovery Implementation Program 2014; June Sucker Implementation Team 1999). The Recovery Program is a multi-agency cooperative effort to coordinate and implement recovery actions for this species. The Program takes an adaptive management approach where biological information is gathered, reviewed, and incorporated into the Program on a continual basis. While the priority is on June sucker, the Program also provides a mechanism to promote the recovery of other federally listed species, and prevent the need for further listings in Utah Lake drainage basin.

The goals of the Recovery Program for June sucker include: 1) recover the species to the extent that it no longer requires protection under the ESA; and 2) allow for the continued operation of existing water facilities and future water development of water resources for human use. The USFWS has designated June sucker as a 5C recovery priority, which means that the species has a high degree of threat of

extinction and a low recovery potential and presence of conflict. To conserve and recover the species, priority is given to monitoring the spawning run, restricting nonnative fish from entering the Provo River, establishing a hatchery for June sucker, enhancing Provo River flows necessary for spawning and early life stage development, restoring habitat, and establishing a self-sustaining spawning run for the species (June Sucker Implementation Team 1999).

Assessment of Effects

Area of Analysis

The analysis area for June sucker would focus on potential points of water diversion in the Provo River and Utah Lake drainage basin that includes occupied or critical habitat for the species. The closest known critical habitat is located approximately 16 miles from the refined transmission corridor (**Figure 6-11**). The analysis area would exclude the transmission line corridors and the potential disturbance area beyond the corridors, since there is no occupied or critical habitat that is crossed by the transmission line corridor and the engineered alignment.

Conservation Measures

The following conservation measure is proposed to avoid water depletion effects on June sucker.

> **SSS-6**: (Approval of Water Use from June Sucker Habitat Areas): Any potential water use from Utah Lake, Provo River, and the Spanish Fork River that would represent a new depletion must be approved by UDWR and the Utah State Engineer, Utah Division of Water Rights.

Direct and Indirect Effects

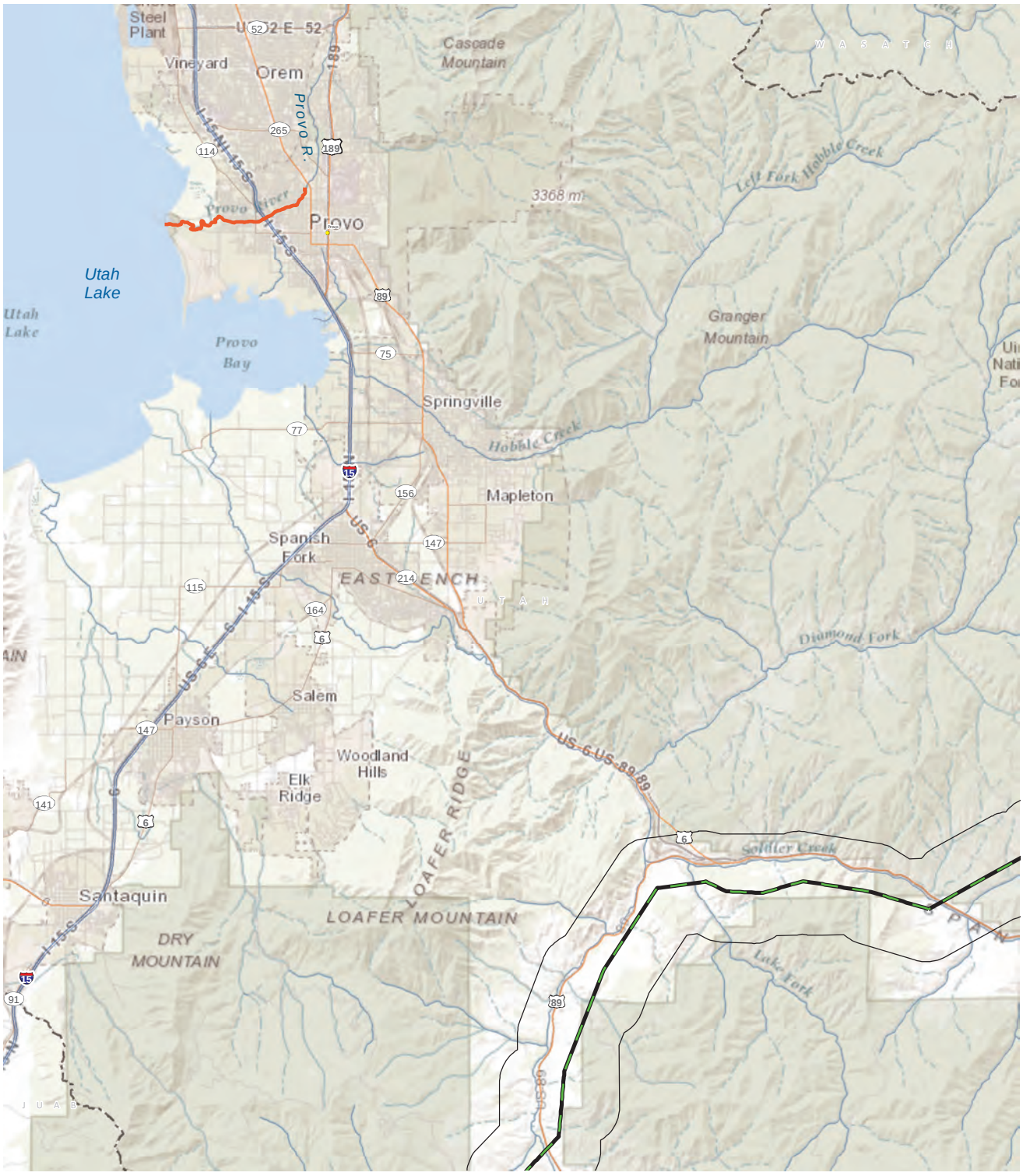
June sucker habitat in Utah Lake and the Provo River is located approximately 25 miles downstream from the refined transmission corridor in Utah. There would be no direct disturbance to habitat due to the considerable distance from the refined transmission corridor and the potential disturbance area beyond the refined transmission corridor.

Since water sources have not been identified at this time, potential construction water use from Utah Lake, Provo River, or the Spanish Fork River could adversely affect habitat from reductions in river flow or lake water levels. Implementation of conservation measure **SSS-6** would ensure that such water use, if needed, would not result in adverse effects to June sucker habitat.

Cumulative Effects

Foreseeable non-federal future actions have been identified within the vicinity of June sucker critical habitat in the lower Provo River include UDWR Rangeland and Riparian Watershed Restoration Focus Areas, the 1250 West Sidewalk Project, and the Provo Westside Connector. The watershed restoration projects would result in beneficial effects to the Provo River. The sidewalk and connector projects could result in temporary surface disturbance near the Provo River, although erosion control measures would be followed to minimize sediment effects on the river. It is possible that future water depletions could occur in the Provo River and drainages entering Utah Lake as a result of non-federal actions such as land development. The Recovery Program for June sucker allows for the continued operation of existing water facilities and future water development of water resources for human use as long as the water use does not adversely affect June sucker.

K:\Projects_4\TransWestExpress\12907_003_Transwest_Express\Figures\DocumentFigures\2015_BA_v2\Aquatic\Fig_6_11_JuneSucker.mxd



Proposed Action
Action Area
June Sucker Critical Habitat

TRANSWEST EXPRESS TRANSMISSION PROJECT

Figure 6-11
Area of Analysis for
June Sucker

0 1 2 4 Miles
0 1 2 4 km
1:250,000

N

Western AREA POWER ADMINISTRATION

Exported On: 2/19/2015

Determination

Effect on the Species: The Proposed Action *may affect, but is not likely to adversely affect* June sucker from potential construction use or water depletion effects on June sucker habitat. The occurrence of June sucker is approximately 25 miles from the corridor and the potential disturbance area beyond the corridor. Therefore, the June sucker would not be directly affected by construction and/or operation/maintenance activities.

If water use is proposed for Utah Lake, Provo River, or the Spanish Fork River, conservation measure **SSS-6** would require approval by UDWR and the Utah State Engineer prior to possible water use.

Effect on Critical Habitat: The Proposed Action *may affect, but is not likely to adversely affect* designated critical habitat, if water use from the Provo River is proposed. Construction and operation activities would not directly affect June sucker critical habitat, since it is located over 25 miles downstream from the action area.

Rationale: June sucker would not be directly affected by construction and operation activities due to the distance from the ground disturbance area to June sucker occupied and critical habitat. Any proposed use of water from Utah Lake, Provo River, or the Spanish Fork River would require approval by UDWR and the Utah State Engineer, which would provide a process for protecting June sucker critical habitat.

6.1.4.5 Razorback Sucker (Endangered)

Environmental Baseline

Conservation Status

The razorback sucker was first proposed for listing as a threatened species under the ESA in 1978 (43 FR 17375). In 1980, the USFWS withdrew the proposal because it was not finalized within the 2-year time limit from the initial publication in the Federal register (45 FR 35410). In 1989, the USFWS received a petition requesting that the razorback sucker be added to the list of endangered species. A positive finding was made and subsequently published by the USFWS in 1991 (56 FR 54957). In 1994, the USFWS designated 15 reaches of the Colorado River system as critical habitat (59 FR 13374). The initial recovery plan for the razorback sucker was published in 1998 and amended in 2002 (USFWS 2002e).

The largest population in the Upper Colorado River Basin exists in the middle Green River between the Duchesne and Yampa rivers, which is considered a single reproducing population (USFWS 2002e). The estimated numbers range from approximately 500 and 950 fish. Relatively low numbers are present in the Yampa, White, and Upper Colorado rivers. The razorback sucker is more widely distributed in the lower basin. In Lake Mead, the population is estimated at about 400 individuals. Approximately 1,000 individuals are believed to inhabit a 60-mile reach between Davis Dam and Lake Havasu.

The comparison of current population levels to historical population size for razorback sucker indicates a decreasing population trend (NatureServe 2013c; USFWS 2002e). However, a review of razorback sucker capture data between 1997 and 2008 indicates the possible benefit of reintroduction of stocked razorbacks, since numbers increased slightly in 2008 (USFWS 2012e). The addition of stocked razorback suckers in all three Colorado River subbasins is encouraging, but there are not sufficient numbers of wild produced juvenile razorback suckers to indicate that these population groups are self-sustaining.

In 1994, the USFWS designated 15 reaches of the Colorado River system, including portions of the Green, Yampa, Duchesne, Colorado, White, Gunnison, and San Juan rivers in the upper basin and portions of the Colorado, Gila, Salt, Verde rivers in the lower basin, totaling 1,724 miles as critical habitat for razorback sucker (59 FR 13374).

Life History and Habitat Association

Razorback sucker currently are present in the Green, upper Colorado, and San Juan river subbasins; lower Colorado River between Lake Havasu and Davis Dam; reservoirs of Lake Mead and Mohave; and in small tributaries of the Gila River subbasin (Verde and Salt rivers and Fossil Creek). In the Upper Colorado River Basin, razorback suckers are considered extant in four locations: Westwater and Cataract canyons and the Colorado-Utah state line on the Colorado River, Desolation/Gray canyons of the Green River, and a population in northeastern Colorado River on the Yampa River.

The types of habitat used by razorback sucker vary depending on the life stage and time of year. Adults use eddies, pools, and backwaters during the nonbreeding period from July through March (Maddux et al. 1993). Seasonal habitat use includes pools and eddies from November through April, runs and pools from July through October, runs and backwaters in May, and backwaters and backwaters and flooded gravel pits during June. Juveniles prefer shallow water with minimal flow in backwaters, tributary mouths, off-channel impoundments, and lateral canals (Maddux et al. 1993). In the upper basin, bottomlands, low-lying wetlands, and oxbow channels flooded and ephemerally connected to the main channel by high spring flows are important habitats for all life stages of razorback sucker. Flow recommendations have been developed that were designed to enhance habitat complexity and restore and maintain ecological processes. In the lower basin, adult razorback sucker utilize open-water areas except in the breeding season when they congregate in shallow, nearshore areas (USFWS 2002e). Juvenile razorback sucker in Lake Mohave occupied vegetated areas near the shore.

Spawning usually occurs in April through mid-June when river flows are relatively high and adult razorback sucker congregate in flooded bottomlands and gravel pits, backwaters, and impounded tributary mouths near spawning sites (USFWS 2002e). Thermal preference for spawning is 22ºC to 25ºC. Razorback sucker typically migrate a long distance in large numbers during the spawning period.

Threats

Threats to razorback sucker include streamflow regulation, habitat modification, competition with and predation by nonnative fish species, and pesticides and pollutants (USFWS 2002e). Most of these factors are similar to those discussed for bonytail. Information specific to razorback sucker is summarized below from USFWS (2002e).

- Habitat – Floodplain habitats were numerous prior to the construction of dams and levees and channelization in the Green and Colorado River systems. The loss of these habitats has been implicated in the decline of the species. However, gravel pits and other artificial, off-channel ponds have been used as a substitute for some of this habitat loss.
- Predation – Nonnative fish species in flooded bottomlands and other low-velocity shoreline habitats in the upper basin are considered to be a limiting factor for razorback sucker recruitment (USFWS 2002e). Adult red shiner is known to be a predator of larval native fishes. In the lower basin, nonnative flathead catfish, yellow bullhead, and largemouth bass prey on young razorback sucker.

Recovery

The upper basin RU is composed of the Green River, Upper Colorado River, and San Juan River subbasins and the lower basin RU includes the mainstem and tributaries of the Colorado River from Lake Mead downstream to the southerly International Boundary with Mexico.

Razorback sucker will be considered eligible for downlisting from “endangered” to “threatened” and removal from ESA protection when all of the following conditions are met:

- Maintain self-sustaining populations in the Green River subbasin and either the Upper Colorado River subbasin or the San Juan River subbasin in the upper basin RU;
- Maintain two genetically and demographically self-sustaining populations in the lower basin RU;
- Maintain a genetic refuge in Lake Mohave;
- Essential habitats, including required instream flows, are legally protected; and
- Other identifiable threats that could significantly affect the population are removed.

The criteria for downlisting and delisting are listed in **Table 6-6**.

Table 6-6 Criteria for Razorback Sucker Downlisting and Delisting

Downlisting	Delisting
Over a 5-year monitoring period: • Maintain self-sustaining populations in the Green River subbasin and either the Upper Colorado River subbasin or the San Juan River subbasin with point estimates that exceed 5,800 adults for each population • Maintain two self-sustaining populations in the lower basin RU with point estimates that exceed 5,800 adults for each population • Maintain a genetic refuge in Lake Mohave • Implement specific management tasks to remove or minimize threats	For 3 years after downlisting: • Maintain self-sustaining populations in the Green River subbasin and either the Upper Colorado River subbasin or the San Juan River subbasin with point estimates that exceed 5,800 adults for each population • Maintain two self-sustaining populations in the lower basin RU with point estimates that exceed 5,800 adults for each population • Maintain a genetic refuge in Lake Mohave • Implement specific management tasks to remove or minimize threats

In addition to management actions being taken to recover razorback sucker, the Recovery Program works to reestablish naturally self-sustaining populations for this species through propagation and stocking (USFWS 2013d). In the Upper Colorado River Basin, razorback sucker are raised at the Grand Valley Unit in Grand Junction and the Ouray Unit in Vernal, Utah. Razorback sucker raised at these two facilities are stocked in the Colorado, Green, and Gunnison rivers.

Assessment of Effects

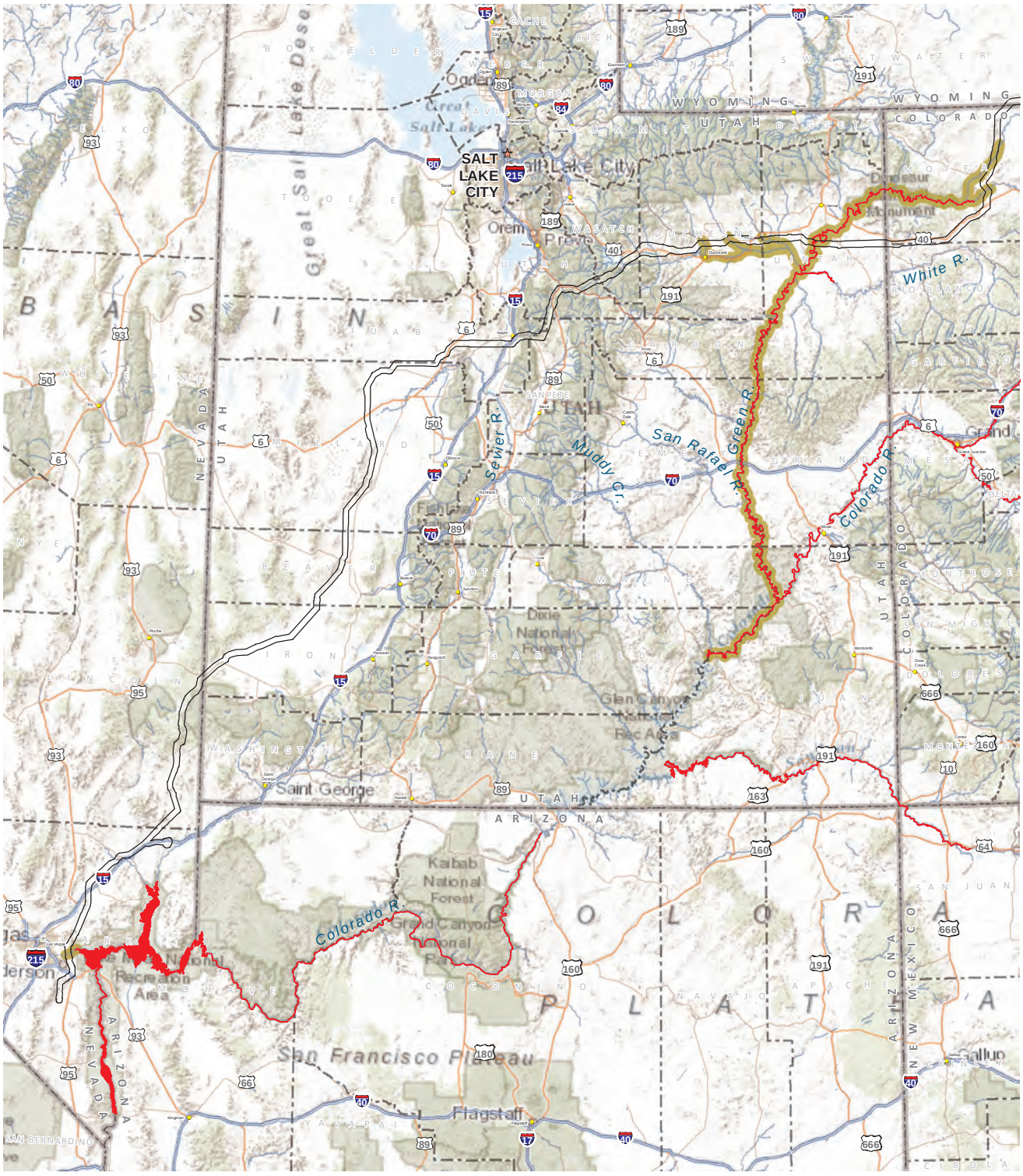
Area of Analysis

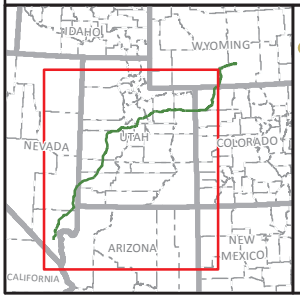
The analysis area for razorback sucker also would include occupied and critical habitat located downstream of the potential points of water diversion to Lake Powell.

The refined transmission corridor and engineered alignment cross occupied habitat for razorback sucker in the Green River. Occupied habitat also is located downstream of the transmission line corridor and engineered alignment in the Little Snake River in Wyoming, the Colorado and White rivers in Colorado, and Las Vegas Wash in Nevada (**Figure 6-12**).

Critical habitat for razorback sucker is crossed by the refined transmission corridor and engineered alignment in the Green River. The critical habitat reach that is crossed as described as follows (59 FR 13399): Utah (Uintah County) – The Green River and its 100-year floodplain from the confluence with the Yampa River to the Sand Wash. Critical habitat reaches for razorback sucker also are located downstream of the transmission line corridor and engineered alignments in the Colorado, White, and Yampa rivers.

K:\Projects_4\TransWestExpress\12907_003_Transwest_Express\Figures\DocumentFigures\2015_BA_v2\Aquatic\Fig_6_12_RazorbackSucker.mxd





Action Area
Analysis Area
Razorback Sucker Critical Habitat

TRANSWEST EXPRESS TRANSMISSION PROJECT

Figure 6-12
Area of Analysis for
Razorback Sucker

0 20 40 80 Miles
0 20 40 80 km
1:3,750,000

N

Western AREA POWER ADMINISTRATION

Exported On: 2/24/2015

Conservation Measures

Impacts to Colorado pikeminnow would be minimized through implementation of the BMPs, design features, and conservation measures described in Chapter 3.0:

- Applicable BMPs ECO-1 and ECO-4.
- Applicant-committed conservation measures and design features: TWE-2, TWE-29, and TWE-31.
- Conservation measures: **SSS-1** and **WR-3**.

The following additional conservation measures are proposed to avoid or reduce effects of the Proposed Action on razorback sucker.

SSS-2 (Avoidance of Water Withdrawal and Entrainment/Impingement Effects for Federally Listed Fish Species): Where critical habitat for the Colorado River federally endangered fish species cannot be avoided as water sources for construction purposes, TransWest would be required to obtain approval from the USFWS and state or federal agencies responsible for managing the land and critical habitat areas. Agency approval would ensure that water withdrawal methods would avoid or minimize entrainment or impingement effects to early life stages of endangered fish species. Requirements for water pumping in critical habitat areas would include: 1) avoidance of pumping between approximately April 1 through August 31, with specific dates dependent upon the water year; 2) intake hoses would be screened with 3/32-inch mesh size; 3) intake velocity would not exceed 0.33 feet/second in an area where larval stages of the federally endangered fish may be present; and 4) pumping from off-channel locations (i.e., no connection to the river during high spring flows) would use an infiltration gallery constructed in a USFWS-approved location. Additional guidance on pumping methodology is provided in the NMFS's (1997) document entitled Fish Screening Criteria for Anadromous Salmonids.

SSS-4 (No Permanent Structures or New Roads in Critical Habitat for Federally Listed Fish Species): No permanent structures or new roads would be constructed in critical habitat for federally endangered fish species. Any temporary disturbance to soils in the 100-year floodplain within critical habitat would be minimized to the extent possible and restoration would be completed to maintain existing conditions. TransWest would avoid siting temporary facilities such as staging areas and helicopter pads in the 100-year floodplain that is designated critical habitat. Additionally, TransWest would avoid temporary river crossings by vehicles within designated critical habitat.

Direct and Indirect Effects

The 250-foot-wide transmission line ROW would cross occupied and 1 acre of critical habitat for razorback sucker in the Green River (Uintah County, Utah). Critical habitat for razorback sucker consists of the 100-year floodplain in the Green River. Implementation of conservation measure **SSS-4** would ensure that impacts to critical habitat would be minimized. The refined transmission corridors and 250-foot-wide transmission line ROWs do not cross other rivers that contain occupied or critical habitat for razorback sucker. Critical habitat is designated for the Las Vegas Wash arm of Lake Mead in Clark County, Nevada. However, construction and maintenance activities would not affect razorback sucker at the Las Vegas Wash crossing, since critical habitat is located at least 2 miles downstream of the Las Vegas Wash crossing. Furthermore, year-round flow does not occur in the section of Las Vegas Wash between the proposed crossing and the lower portion of the wash that represent an arm of Lake Mead.

Implementation of conservation measure **SSS-2** would avoid impacts associated with potential entrainment or impingement of early life stages of razorback sucker in the Green River, if water is withdrawn for construction purposes (i.e., dust control or concrete foundations) from critical habitat that supports spawning or nursery areas.

Implementation of BMPs, the Applicant-committed mitigation measures and design features, and general conservation measures described in Chapter 3.0 along with conservation measures **SSS-2** and **SSS-4** described above would avoid or minimize direct and indirect adverse effects on razorback sucker that could result from sedimentation, riparian removal, and potential fuel spill risks in the Green River. Any riparian vegetation removal would be limited to a relatively small section of the river crossed by the 250-foot-wide transmission line ROW.

There could be potential water depletions in the Upper Colorado Basin from construction water use for dust control and concrete preparation. Water use for this project would be obtained from municipal sources, commercial sources, or a temporary water use agreement with landowners holding existing water rights. Since specific water sources have not been identified at this time, the USFWS cannot determine if the water sources have been through Section 7 consultation. Therefore, the USFWS assumes that all of the construction water use would be new depletions. This action would represent a consumptive water use from the Upper Colorado Basin of 109 acre-feet for Region I and 110 acre-feet for Region II during a 3-year time frame when water would be used for construction purposes. The total estimated depletion for the Upper Colorado River Basin would be 219 acre-feet. This volume represents an average annual depletion of 73 acre-feet per year for the 3-year construction period. New depletions represent an adverse effect on endangered fish species in the Upper Colorado River.

As part of flow requirements for the four endangered fish species in the Upper Colorado River Basin (Colorado pikeminnow, humpback chub, bonytail, and razorback sucker), water use for projects must comply with the Recovery Plan (USFWS 2013d). Details on how the Recovery plan would be applied to water depletions are discussed in Section 6.1.4.1. The Recovery Plan would be effective in minimizing effects of potential water depletions on razorback sucker habitat. However, if new water sources are used that have connections to surface flows in the Upper Colorado River Basin and they have not been previously consulted on by the USFWS, there could be a small net residual effect on razorback sucker habitat. It is not possible to quantify the net effect other than relative terms, since specific water sources have not been identified at this time.

Cumulative Effects

No reasonably foreseeable non-federal future actions have been identified within the vicinity of the Project action area. However, it is reasonable to expect that future water depletions could occur in the Upper Colorado River as a result of non-federal actions such as agricultural or land development. The Recovery Plan was established to mitigate the effects of water depletions on federally endangered fish species in the Upper Colorado River Basin.

Determination

Effect on the Species: The Proposed Action *may affect, and is likely to adversely affect* the razorback sucker as a result of potential water depletions. Construction and operation activities would not directly affect razorback sucker, since there is a BLM management requirement and an additional conservation measure that would minimize ground disturbance within the 100-year floodplain. The Herbicide Use Plan would minimize potential effects of maintenance activities on razorback sucker.

Effect on Critical Habitat: The Proposed Action *may affect, and is likely to adversely affect* designated critical habitat as a result of potential water depletions. Construction and operation activities would not directly affect razorback sucker, since there would be no ground disturbance allowed in the 100-year floodplain.

Rationale: Any water depletions in the Upper Colorado River Basin may affect occupied and critical habitat for the four federally endangered fish species. However, the Recovery Program would provide funds to assist in reducing the effects of flow reductions on the four federally endangered fish species in the Upper Colorado River Basin. The magnitude of the water depletion would depend on the selected water sources and whether they are connected to surface flows in the Upper Colorado River Basin and if

they have been consulted on previously by the USFWS. Specific water sources will be determined at a later phase of the Project.

6.1.4.6 Virgin River Chub (Endangered – Virgin River; Not Listed – Muddy River)

Environmental Baseline

Conservation Status

The Virgin River chub was officially listed as federally endangered in 1989, but designation of critical habitat was postponed (54 FR 35305). In 2000, 87.5 miles of the Virgin River in Utah, Arizona, and Nevada was designated as critical habitat (65 FR 4140). When the species was listed, the USFWS recognized that a closely related species was found in the Moapa (Muddy) River in Nevada, but it was affected by the listing in 1989. A recovery plan for the Virgin River chub was published in 1995 (USFWS 1995e).The Muddy River population is not considered part of the federal listing at this time. However, a proposed rule change regarding federal listing is under review by the USFWS.

The current distribution of Virgin River chub in the Muddy River primarily includes the middle reaches between the Warm Springs bridge and the Wells Siding diversion (NatureServe 2013d). Surveys in the Warms Springs area collected several individual chub in 2007. Virgin River chub numbers in the middle Muddy River continue to decline based on limited sampling (Desert Fishes Council meeting, as cited in NatureServe 2013c).

Life History and Habitat Association

Virgin River chub is endemic to the Virgin River system in southwestern Utah, southern Nevada, and northwestern Arizona, and the Muddy (Moapa) River in Nevada. The current range for this species includes the Muddy River and the Virgin River from near the Nevada-Arizona border to the southwestern corner of Utah (IUCN 2013). A captive population of the Virgin River chub also is currently maintained at the Dexter National Fish Hatchery and Technology Center as a refugium population and propagation studies (USFWS 1995c).

Adult and juvenile Virgin River chub prefer deep runs and pools with slow to moderate velocities containing boulders or instream cover over sand or gravel substrate (65 FR 4141; USFWS 2013e, 1995c). Generally, larger fish occur in deeper portions of the stream. This species seems to avoid shallow riffles (Cross 1976, as cited in USFWS 1996b). The species is very tolerant of high salinity and turbidity (USFWS 2013c)

In 2000, 87.5 miles of the Virgin River in Utah, Arizona, and Nevada including the mainstem and the 100-year floodplain was designated as critical habitat (65 FR: 4140-4156). A separate population of the Virgin River chub that occurs in the Muddy River is not considered to be part of the federal listing or critical habitat designation at this time. A separate listing determination or candidate assessment review for the Virgin River chub population in the Muddy River is considered to be warranted (USFWS 2008b).

Virgin River chub spawns during late spring and early summer over gravel and rock substrates (USFWS 2013e). No parental care is provided for the eggs, which usually hatch in one week or less. Long-term monitoring in the upper portion of the Virgin River, where red shiner does not occur, indicates that this species reproduces successfully in most years (USFWS 2008b). Some level of recruitment to the adult population appears to occur in most years, based on the presence of early age classes.

Threats

Threats to the Virgin River chub in the Virgin River are described in the Virgin River Fishes Recovery Plan (USFWS 1995c) and the Five-Year Review for Recovery (USFWS 2008b). Since the Virgin River is not crossed by the refined transmission corridor, threats to the Virgin River chub for this population are not described in this Biological Assessment. Threats to the Muddy River and its Virgin River chub population, which is crossed by the Project's transmission line corridor, include changes in flow and

water quality, habitat alteration, completion and predation by nonnative fishes, and parasitism (NatureServe 2013d; USFWS 1996b).

Recovery

A recovery plan has not been implemented for the Virgin River chub population in the Muddy River, since it is not federally listed at this time.

Assessment of Effects

Area of Analysis

The analysis area for Virgin River chub would include occupied habitat crossed by the refined transmission corridor and the potential disturbance area beyond the refined transmission corridors plus an approximate 1-mile downstream segment from the ROW crossing to address direct effects of the Project. The transmission line corridor and engineered alignment cross occupied habitat for Virgin River chub in the Muddy River (**Figure 6-13**). Occupied habitat also is located downstream of the refined transmission corridor and engineered alignment in the Colorado River and tributaries near the confluence with the Colorado, Price, and White rivers.

The refined transmission corridor and engineered alignment cross occupied habitat for Virgin River chub in the Muddy River. As previously mentioned, the Muddy River population is not federally listed at this time. The refined transmission corridor does not cross the Virgin River.

Conservation Measures

Impacts to Virgin River chub and its habitat would be minimized through implementation of the following BMPs, design features, and conservation measures referenced or described in Chapter 3.0:

- Applicable BMPs involving sediment control (WAT-9).
- Applicant-committed conservation measures and design features: TWE-8, TWE-12, TWE-13, TWE-19, TWE-22, and TWE-24.
- Conservation measures: **SSS-1** and **WR-3**.

The following additional conservation measure is proposed for Virgin River chub:

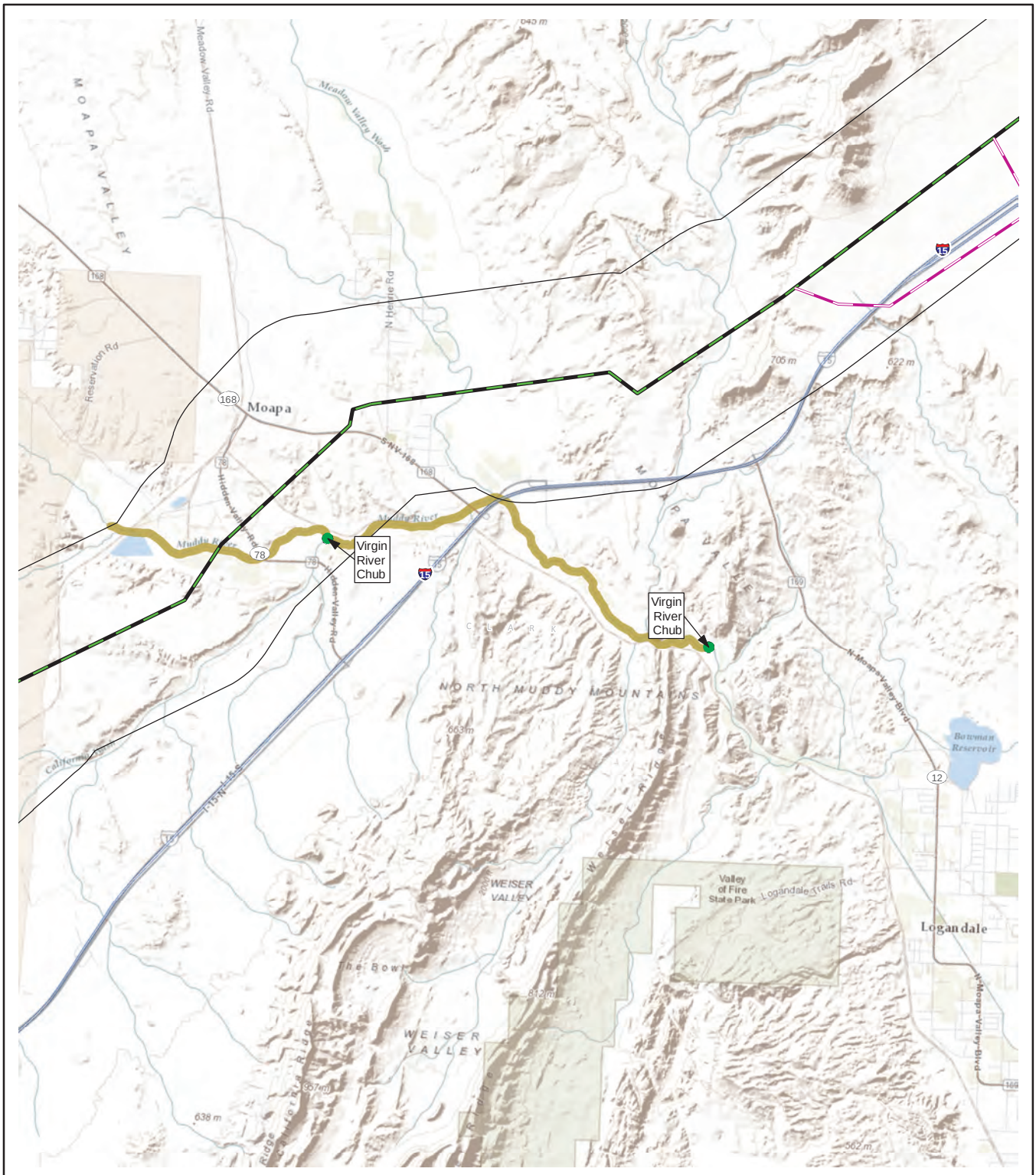
SSS-11 (No Vehicle Crossings or New Roads in the Muddy River): No vehicle crossings or new roads would be constructed for the Muddy River. This measure would protect habitat for Virgin River chub by avoiding habitat alteration or loss.

Direct and Indirect Effects

The 250-foot-wide transmission line ROW and transmission line would cross one stream, the Muddy River, in Clark County, Nevada, which contains Virgin River chub. Implementation of conservation measure **SSS-11**, described above, would prevent any direct disturbance to Virgin River chub habitat that could result from vehicle traffic and equipment disturbance in the river.

Indirect effects involving sedimentation could adversely affect water quality in the Muddy River from ground disturbance within or near the river. Vehicle and equipment use within or near the Muddy River also could pose a risk to aquatic biota from fuel or lubricant spills. The implementation of BMPs, Applicant-committed mitigation measures and design features and additional conservation measures listed above and described in Chapter 3.0, along with **SSS-11** described above, would avoid or minimize impacts to Virgin River chub habitat that could result from erosion and sedimentation or spillage of fuels and lubricants during construction.

K:\Projects_4\TransWestExpress\12907_003_Transwest_Express\Figures\DocumentFigures\2015_BA_v2\Aquatic\Fig_6_13_VirginRiverChub.mxd



Proposed Action
Virgin River Chub Occurrence
Action Area
Analysis Area

TRANSWEST EXPRESS TRANSMISSION PROJECT

Figure 6-13
Area of Analysis for
Virgin River Chub

0 0.5 1 2 Miles
0 0.5 1 2 km
1:100,000

N

Western AREA POWER ADMINISTRATION

Exported On: 2/20/2015

Construction at stream crossings also could remove riparian vegetation. Vegetative cover along streambanks provides cover for fish, shading, bank stability, and increased food and nutrient supply as a result of deposition of insect and vegetative matter into the watercourse. Riparian vegetation also contributes woody material to streams that are used for fish cover and can be part of forming habitat features such as pools. Disturbance to the streambank areas at stream crossings would represent a relatively small width (portion of 250-foot-wide transmission line ROW on each streambank). Given the relatively small width of the disturbance area associated with an individual stream crossing, impacts would be considered low in relation to the entire stream system. These impacts could be easily avoided by spanning riparian habitat along the Muddy River.

If construction water use utilized water from the Muddy River, flow reductions could decrease the amount of Virgin River chub habitat. The magnitude of the habitat effect would depend on the volume of water withdrawn and life stages of Virgin River chub that may be present downstream of the withdrawal point.

Cumulative Effects

No reasonably foreseeable non-federal future actions have been identified within the vicinity of the Project action area near the Muddy River.

Determination

Effect on the Species: For clarification, the Virgin River chub population in the Muddy River is not part of the federal listing or critical habitat designation for this species at this time. However, a determination is made because the Virgin River chub population in the Muddy River is considered to be warranted for future listing or candidate status.

The Proposed Action *may affect, is not likely to adversely affect* the Virgin River chub in the Muddy River.

Effect on Critical Habitat: The Proposed Action would have *no effect* on designated critical habitat for this species as no critical habitat has been designated for Virgin River chub in the Muddy River.

Rationale: The implementation of BMPs and additional conservation measures would be used to avoid direct loss or alteration of habitat and minimize indirect effects involving potential sediment input and fuel spill risks to the Muddy River. The Nevada State Engineer approval process would ensure that special status species such as the Virgin River chub would not be adversely affected by water use, if it is proposed for the Proposed Action.

6.1.5 Plants

6.1.5.1 Clay Phacelia (Endangered)

Environmental Baseline

Conservation Status

The clay phacelia (*Phacelia argillacea*) was listed as endangered under the ESA on June 28, 1978. No critical habitat has been proposed or designated for this species. A recovery plan was published on April 12, 1982.

The species occurs in two known locations in Spanish Fork Canyon in Utah County, Utah: one in the vicinity of Tucker, and one approximately 6 miles down-canyon near Mill Fork Canyon. The total population size has been estimated at approximately 200 individuals.

Critical habitat has not been designated for clay phacelia.

Life History and Habitat Association

Clay phacelia occupies sparsely populated pinyon-juniper woodland, montane shrub, and other barren and sparsely vegetated areas specifically found on steep slopes (up to 70 percent). The species is associated with skunkbush sumac (*Rhus trilobata*) and serviceberry (*Amelanchier alnifolia*) on shaley clay colluviums of the Green River Formation. Populations are found between 6,000 and 7,000 feet amsl (USFWS ECOS 2014b).

Clay phacelia has blue to violet flowers and stands 4 to 14 inches tall. It is a biennial species that flowers between late May and early June. Initial foliage leaves are small, but by early to mid-October, basal rosettes have formed and can be up to 2.8 inches wide. The rosettes grow slowly under the snow, and bolt only after the snow melts and air temperatures increase significantly (USFWS ECOS 2014b). Clay phacelia was formerly considered a winter annual but new data indicates that it is actually a true biennial. The life history of a biennial includes seedling emergence in the spring, growth of a rosette in the summer, vernalization during the following winter, and flowering, seed set, and death the second summer (USFWS ECOS 2014b).

As the plant grows, the number of flowers displayed becomes greater. Spring and summer precipitation is necessary to allow plants to continue flowering into autumn, with the last of the season's flowers observed typically in mid-October. Plant size appears to be a function of available soil moisture. Clay phacelia is dependent on a few rain events to release seedlings; therefore, alterations to the timing and frequency of rainfall and snow may greatly affect species recruitment (USFWS 2013f). Clay phacelia has the capacity to develop four mature seeds per fruit and thus can be a prolific seeder (USFWS ECOS 2014b). Pollination studies suggest they require insect pollinators (USFWS ECOS 2014b) and observations have shown the likelihood of more than one pollinator. Several species of small to medium-sized mostly solitary bee species have been seen in the vicinity of clay phacelia (USFWS ECOS 2014b). It also has been speculated that wind could prove to be a major pollinator of the species in addition to bees (NatureServe 2014).

Threats

Current threats to the species include climatic changes, edaphic factors, as well as its small population size. Additional threats include declining population trends as a result of trampling, livestock and wildlife herbivory, noxious and invasive weed species, railroad maintenance, and destruction of habitat for transportation, transmission line, railroad, and oil and gas development (Tilley et al. 2010a; USFWS 2013f; USFWS ECOS 2014b).

Recovery

A recovery plan was published for clay phacelia in 1982 and in August 2013, the findings of the *Clay Phacelia 5-Year Review: Summary and Evaluation* was completed. This review summarizes and evaluates current research, surveys related to the species and information provided in the recovery plan. The review determined that clay phacelia has benefited from successful collaborations and partnerships with federal, state, and private conservation groups. In addition, the USFWS *Preventing Extinction* grant provided funding to study previously unknown life history factors and to establish a seed library and support seed propagation efforts.

The goal of the recovery effort is to establish new populations on publically owned lands that receive a higher level of protection relative to privately owned lands. The objective of the recovery plan is to establish a self-sustaining population of 2,000 to 3,000 individuals on 120 acres of protected habitat and to possibly establish at least one new population (Tilley et al. 2010a; USFWS 2013f, 1982). In 2005, seed collections and germination studies yielded 53 potted plants, which subsequently produced 11,000 seeds towards recovery of this species.

The recovery criteria of 2,000 to 3,000 individuals and the establishment of additional populations have not been met at this time; however, efforts are ongoing. Further, the understanding of the species has

increased considerably and several of the threats identified in the recovery plan have been reduced. The USFWS concluded that no change to the species classification is needed. The 5-year review (USFWS 2013f) recommended the following survey, monitoring, and research practices:

- Continue to monitor population size of this species through time.
- Monitor seed bank viability, seedling recruitment, and seedling survivorship.
- Document and quantify herbivory from free-ranging herbivores.
- Revisit occupied sites, create GPS coordinates for each plant location, and identify areas to survey where the plant could occur.
- Monitor invasive, exotic species distribution and abundance in suitable habitat.
- Complete a population viability analysis for this species and reevaluate the number of individuals needed for a healthy population.
- Continue collecting and maintaining a genetically representative ex-situ seed collection for the species.
- Augment introduced sites to ensure genetic representation of the species on federal lands.
- Study the effects of climate change on this species including how altered precipitation, water volume, availability, and timing of rain events could affect the species.
- Determine the environmental conditions and tolerances necessary for each life stage of the species.
- Determine if and how road and railway traffic volume influences this species, and its community associates such as pollinators.
- Determine the extent to which the plants and their pollinators are being affected by road and railroad maintenance activities.
- Re-examine the genetic diversity of this species in the future to determine if genetic diversity has been maintained or been reduced through time, using samples from multiple years.
- Study the plants' pollinators and the pollinators' habitats.
- Determine the effects of erosion on the species and identify actions that could restore soil conditions.
- Examine conditions surrounding seedling emergence, the dynamics and characteristics of the seed bank including seed dormancy and germination (USFWS 2013f).

Assessment of Effects

Area of Analysis

In keeping with the Clay Phacelia Conservation Measures provided by the USFWS (USFWS 2013g), the clay phacelia analysis area is defined by the type of activity within suitable habitat. In areas where temporary ground disturbance would occur, a buffer distance of 650 feet would be applied to suitable habitat. In areas where herbicides would be used, a buffer distance of 2,500 feet from the edge of suitable habitat would be applied. For the purpose of this document, the analysis area for clay phacelia is defined as the spatial extent of potential habitat within the project disturbance areas, plus a 650-foot buffer. Project disturbance areas are defined in Section 2.2. This analysis area is based on the following assumptions:

- Pre-construction surveys have not been conducted to verify the extent of suitable habitat; therefore, the use of model-generated potential habitat would be applied as a conservative estimate.

- Site-specific locations of access roads have not been defined; therefore, it is assumed that ground disturbance could occur anywhere within the analysis area.
- TransWest has committed to prohibiting herbicide use within 2,500 feet of occupied or suitable clay phacelia habitat.

Within the analysis area, the species has been identified in two distinct clusters. The first cluster is located within the refined transmission corridor, approximately 2,200 feet southwest of the preliminary engineered alignment and extending approximately 0.5 mile within the refined transmission corridor. The second cluster is located within the analysis area (adjacent to the refined transmission corridor) approximately 1 mile southwest of the preliminary engineered alignment. In addition to these two naturally occurring clusters, there are a number of reintroduction sites within the refined transmission corridor and analysis area. Based on the current alignment of the Proposed Action and the nominal span distance of the transmission line, direct impacts to the species (including the reintroduction sites) are not anticipated. Indirect impacts could occur due to the populations' proximity to the engineered centerline. Additionally, these known occurrences are found on steep slopes with fine textured soil and fragmented shale derived from the Green River Formation. As the species grows on barren, precipitous hillsides and fine textured soil, it is extremely susceptible to erosion and sedimentation, and its habitat would be difficult to reclaim.

Conservation Measures

Impacts to clay phacelia habitat would be minimized through implementation of the following design features and conservation measures described in Chapter 3.0:

- Applicant-committed conservation measures and design features: TWE-1 – TWE-7, TWE-9 – TWE-13, TWE-19, TWE-22–TWE-23, TWE-26 – TWE-27, TWE-29, TWE-31, TWE-33 – TWE-34, TWE-47, TWE-57 – TWE-62, and TWE-64.
- Conservation measures **NX-1**, **SS-1**, **SS-3**, **SS-4**, **SS-5**, **SS-6**, and **SS-9**.

In addition, the following species-specific conservation measures would be implemented for clay phacelia:

SS-8: (Avoidance and Minimization of Impacts to Clay Phacelia).

1. 100 percent clearance surveys (within 650 feet of the centerline through all modeled suitable habitat) would establish the extent of occupied habitat that occurs in the area and any Project constraints. These surveys should occur between late May and early July.
2. All occupied sites would be avoided by development within the 250-foot-wide Project transmission line ROW (including structures, facilities, and new roads) by at least 650 feet. The distance could be adjusted in coordination with the authorizing agency and the USFWS in order to properly protect the plants from all disturbances. (Example: May be a larger distance if there is a higher risk of erosion or shorter distance if there is a lower risk chance of erosion).
3. Appropriate erosion (i.e., silt fence, straw waddles) control measures would be constructed if disturbance is allowed within 650 feet of occupied habitat or if such measures are needed to prevent sedimentation or dust deposition.
4. A qualified botanist would be on-site to monitor surface-disturbing activities when clay phacelia is within 650 feet of those surface disturbing activities.
5. Only water (no chemicals, reclaimed production water or other) would be used for dust abatement measures within occupied clay phacelia habitat.

6. Dust abatement would be employed during maintenance activities in modeled suitable clay phacelia habitat over the life of the project during the time of the year when the plant is most vulnerable to dust-related impacts (March through August).
7. No herbicide treatments within 2,500 feet of occupied clay phacelia habitat and no aerial herbicide treatments within modeled suitable habitat.
8. Limit upgrades to existing access roads within 650 feet of occupied clay phacelia habitat to those that eliminate the need to construct a new road, or are necessary for safety. Upgrades also would be designed to limit impacts to clay phacelia.

Direct and Indirect Effects

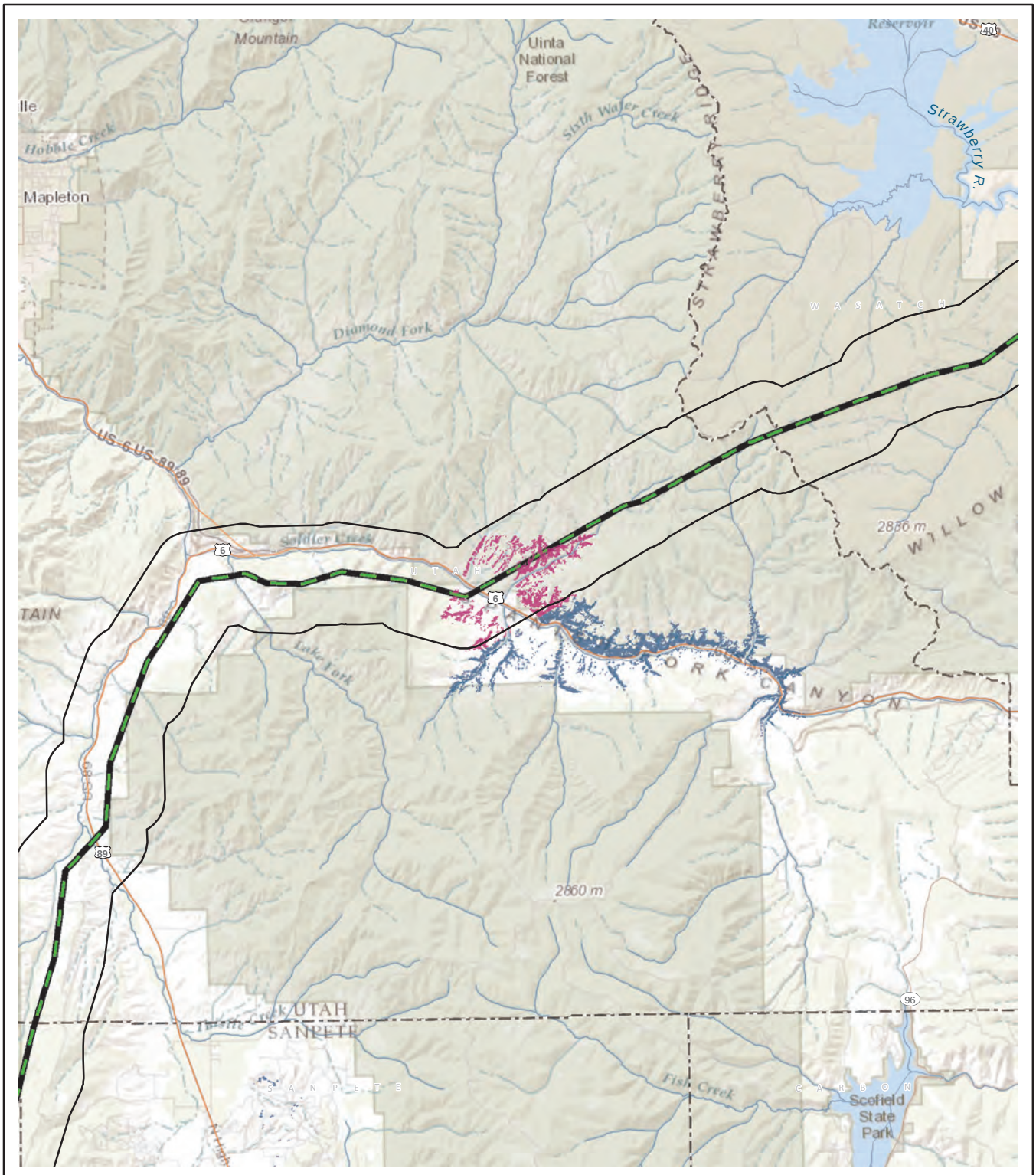
Construction and operation of the Proposed Action would have no impact on known populations of clay phacelia, which are located over 2.3 miles away and upgradient from the edge of the action area, and no impact on clay phacelia reintroduction sites, the nearest of which are approximately 1.2 miles away and upgradient from the edge of the action area. However, the action area does traverse modeled clay phacelia habitat and Project construction and maintenance activities have potential to adversely affect this habitat and any unknown occurrence of clay phacelia which could occur within it. Habitat suitability modeling completed by the USFS in 2013 identified approximately 1,353 acres of potentially suitable clay phacelia habitat, of which a maximum of 11 acres (0.8%) would have potential to be impacted within the analysis area (**Figure 6-14**).

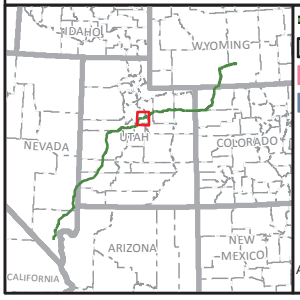
Within the 250-foot-wide transmission line ROW and refined transmission corridor, surface disturbances would consist of ROW clearing in preparation for transmission structure installation, as well as vegetation removal and blading to facilitate the construction of temporary and permanent aboveground and belowground ancillary facilities. Surface-disturbing activities outside of the refined transmission corridors would be limited to development and maintenance of access roads and temporary work areas.

Implementation of the Applicant-committed measures and design features and general conservation measures listed above and described in Chapter 3.0 along with conservation measure **SS-8** described above would avoid Project-related impacts to clay phacelia and field-verified suitable habitat.

Possible indirect impacts to the clay phacelia could result from construction-related erosion and sedimentation, generation of fugitive dust, the spread and establishment of noxious and invasive weed species, habitat fragmentation, the potential loss of pollinators, and increased opportunities for illegal collection of individual plants. These impacts would be avoided by implementation of conservation measure **SS-8**.

Linear surface disturbances such as those associated with transmission lines and roads provide pathways (Gelbard and Belnap 2003; Watkins et al. 2003) and serve as sources of propagules (D'Antonio et al. 2001) for noxious weeds and other invasive plant species to infest adjacent undisturbed areas. Localized surface disturbances are known to facilitate the invasion of noxious and invasive species by removing native vegetative cover, creating areas of bare ground (Burke and Grime 1996; Watkins et al. 2003), and increasing light and nutrient availability (Stohlgren et al. 2003, 1999). Noxious and invasive species compete with native plants, can degrade and modify native communities, and reduce resources (e.g., moisture, soil nutrients, light) for native species. Impacts to clay phacelia and suitable clay phacelia habitat from noxious weeds and other invasive plants would be avoided or minimized through implementation of conservation measure **NX-1**.





- Proposed Action
- Action Area
- Analysis Area for Clay Phacelia
- Modeled Suitable Habitat for Clay Phacelia (USFS 2013)

Action Area Buffer for Analysis Areas:
Clay phacelia - 650 feet

TRANSWEST EXPRESS TRANSMISSION PROJECT

Figure 6-14
Areas of Analysis for
Clay Phacelia

0 1 2 4 Miles
0 1 2 4 km
1:250,000

N

Western AREA POWER ADMINISTRATION

Exported On: 2/24/2015

K:\Projects_4\TransWestExpress\12907_003_Transwest_Express\Figures\DocumentFigures\2015_BA_v2\SSPlantsFig_6_14_ClayPhacelia.mxd

Operation impacts include the effects of future maintenance activities for the transmission line and its ROW. Potential direct impacts to clay phacelia resulting from operation activities would be related to access road and ROW maintenance and vegetation management activities. These impacts would be avoided through implementation of the above design features and conservation measures.

Direct and indirect impacts to the species associated with decommissioning and reclamation of the Project and ROW are anticipated to be similar to those presented for construction impacts.

Cumulative Effects

No reasonably foreseeable non-federal future actions have been identified within the vicinity of the Project action area.

Monitoring

There are currently no known short- or long-term monitoring and reporting plans for clay phacelia in the Project analysis area.

Determination

Effect on the Species: The Proposed Action *may affect, but is not likely to adversely affect* clay phacelia.

Effect on Critical Habitat: No critical habitat has been proposed or designated for this species; thus, the Proposed Action would have *no effect* on critical habitat for clay phacelia.

*Rationale: The GIS-based assessment of Project impacts to modeled potential habitat for clay phacelia provides a conservative, worst-case scenario of potential impacts to this species and still results in a relatively small portion (0.8%) of modeled habitat affected. In reality, given that modeled habitat occurs on steep side hills and drainages, it is anticipated that this habitat would be avoided during the next phase of engineering design by locating potential tower sites and access roads alignments outside of the modeled habitat polygons and avoiding any other impacts to potential habitat along the ROW by spanning these areas. Avoidance of impacts would be further ensured by conducting a habitat assessment prior to final engineering design. Though unlikely based on the distribution of modeled habitat, if field-verified suitable habitat could not be avoided by Project facilities, this habitat would be surveyed for clay phacelia in accordance with USFWS-approved survey protocols. Should any clay phacelia individuals or populations be found within 650 feet of areas of planned surface disturbance, impacts to these individuals would be avoided through facility micro-siting and other activities identified in conservation measure **SS-8** as well as through the use of, if necessary, special construction practices.*

6.1.5.2 Deseret Milkvetch (Threatened)

Environmental Baseline

Conservation Status

The Deseret milkvetch (*Astragalus desereticus*) was listed as threatened under the ESA on October 20, 1999. No critical habitat has been proposed or designated for this species and no recovery plan has been published to date.

The species is an endemic occurring only on the sandy-gravelly hillsides of the Moroni Formation in the Thistle Creek watershed near the community of Birdseye in Utah County, Utah. The known spatial extent of the species is small, covering approximately 278 acres, mostly on lower slopes along the east side of US-89. The population size in this single area ranges from 500 to 10,000 individuals. Surveys conducted in 2006 indicated that the known population has increased by 31 percent since the time of listing.

Life History and Habitat Association

Deseret milkvetch occupies montane shrub, desert shrub, pinyon–juniper woodland, and other sparsely vegetated communities. It is specifically adapted to sparse juniper-sagebrush (*Artemisia* spp.) communities on steep, naturally disturbed south and west (rarely north) facing slopes. Populations are found between 5,400 and 5,700 feet amsl (USFWS 2011e; USFWS ECOS 2014b). Where the species is located, upper slopes are steep and dominated by outcrops of poorly consolidated bedrock. Here, it occurs very sparsely, as the erosion rate generally exceeds the rate of soil formation; hence, there is little available rooting substrate. Middle slopes are moderately steep and have a thin mantle of loose, sandy soil overlying the parent material. Although the plant is more abundant on middle slopes than it is on upper slopes, high erosion rates create habitat instability which appears to limit the size (and probably the life span) of individual plants. Lower slopes (those closest to US-89) are more gradual and have deeper soils. In these areas, Deseret milkvetch cover is at its maximum, and the plants are generally much larger (and probably longer-lived) than on mid-slopes. Large and vigorous plants also are found on the adjoining west-facing road cuts above the highway (NatureServe 2014).

Deseret milkvetch is a perennial, herbaceous, almost stemless member of the bean family. Individual plants are 2 to 6 inches tall and arise from the base of an herbaceous stem. The pinnately compound leaves are 2 to 4 inches long with 11 to 17 leaflets. Leaflets are elliptical to ovate, with dense, silvery gray pubescence on both sides. Seed pods are 0.4 to 0.8 inch long and densely covered with hairs. The flower petals can be either completely white or off-white with pinkish wings and a lilac keel-tip (USFWS ECOS 2014b).

Deseret milkvetch likely reproduces sexually with flowering and seed set occurring in May and June. Based on the characteristics of the flower, it's believed that bees pollinate this species. Fruiting occurs after pollination between June and July and mature plants, defined as those greater than 4 inches in diameter, produce the most fruits. Once the seed pods are mature, they fall off the plant, crack open at the tip, and release seeds. For many *Astragalus* spp., seeds can remain dormant for a considerable amount of time (USFWS ECOS 2014b). This adaptation serves two functions: optimizing seedling survival and spreading germination over time so that a catastrophic event (such as drought or fire) does not kill all the seedlings. Pre-dispersal predation of *Astragalus* seeds by several types of insect larvae has been reported (NatureServe 2014) but field observations indicated that seed predation occurs infrequently. However, these observations could be influenced by fluctuating insect populations in relation to climatic and other factors (USFWS ECOS 2014b).

Plants begin the active growing season shortly after snow melt during mid-April. When temperatures are hot and dry at the end of summer, the leaves closest to the ground die back and new buds form at the soil level. These buds generally survive the winter because they are protected from severe cold by snow cover (USFWS ECOS 2014b).

Many species of *Astragalus* in the Intermountain region are poisonous to livestock (NatureServe 2014). Many synthesize nitrotoxins to which cattle and sheep are particularly susceptible. In addition, a few species produce an alkaloid compound causing the disease "locoism" found primarily in horses.

The apparent population restriction of Deseret milkvetch to a single locality raises the question of whether it is a relatively "new" species in geologic time or a relict population of an older species that was once more widely distributed. Many endemics in *Astragalus* are restricted to inhospitable substrate conditions or limited by the abundance or absence of some particular soil mineral such as selenium, gypsum, or lime (NatureServe 2014). It is unknown if Deseret milkvetch is restricted to some confining ecological niche or whether it is unable (or perhaps has not had sufficient time) to expand into other areas of potentially suitable habitat. Franklin (1990) reports that Deseret milkvetch is specific to its current location and that soils on other outcrops in the vicinity are less sandy and possibly too clay-rich to support the species.

Intolerance of shade is very common within this genus (NatureServe 2014) and Deseret milkvetch is seemingly excluded from the denser pinyon-juniper woodland communities characteristic of slopes in the vicinity of its current population. However, there appears to be little likelihood that this single population would ever decline significantly via competitive exclusion by woodland dominants given that the high soil erosion rates associated with its steep-slope habitat.

Threats

Current threats to the species include residential development, highway widening, wildlife management, and livestock grazing and trampling. Its restricted distribution and single, small population size is another threat especially when considered in combination with the previously mentioned impacts (USFWS 2011e; USFWS ECOS 2014b).

Recovery

In 2011, the findings of the *Deseret Milkvetch 5-Year Review: Summary and Evaluation* were completed. The review determined that many of the previously identified threats were not as significant as expected or had failed to develop all together. Also, the species' known range and population size is greater than previously thought. Due to these factors, the USFWS concluded that the species should be delisted due to absence of threats (USFWS 2011e). Implementation of the Proposed Action, particularly when considered in combination with other high voltage transmission lines that have been proposed to traverse the same area, could introduce a new threat that could result in a USFWS determination not to delist the species (USFWS 2012f).

In addition to the recommendation to remove the species from the threatened species list, the 5-year review recommended the following survey, monitoring, and threat abatement practices as future actions:

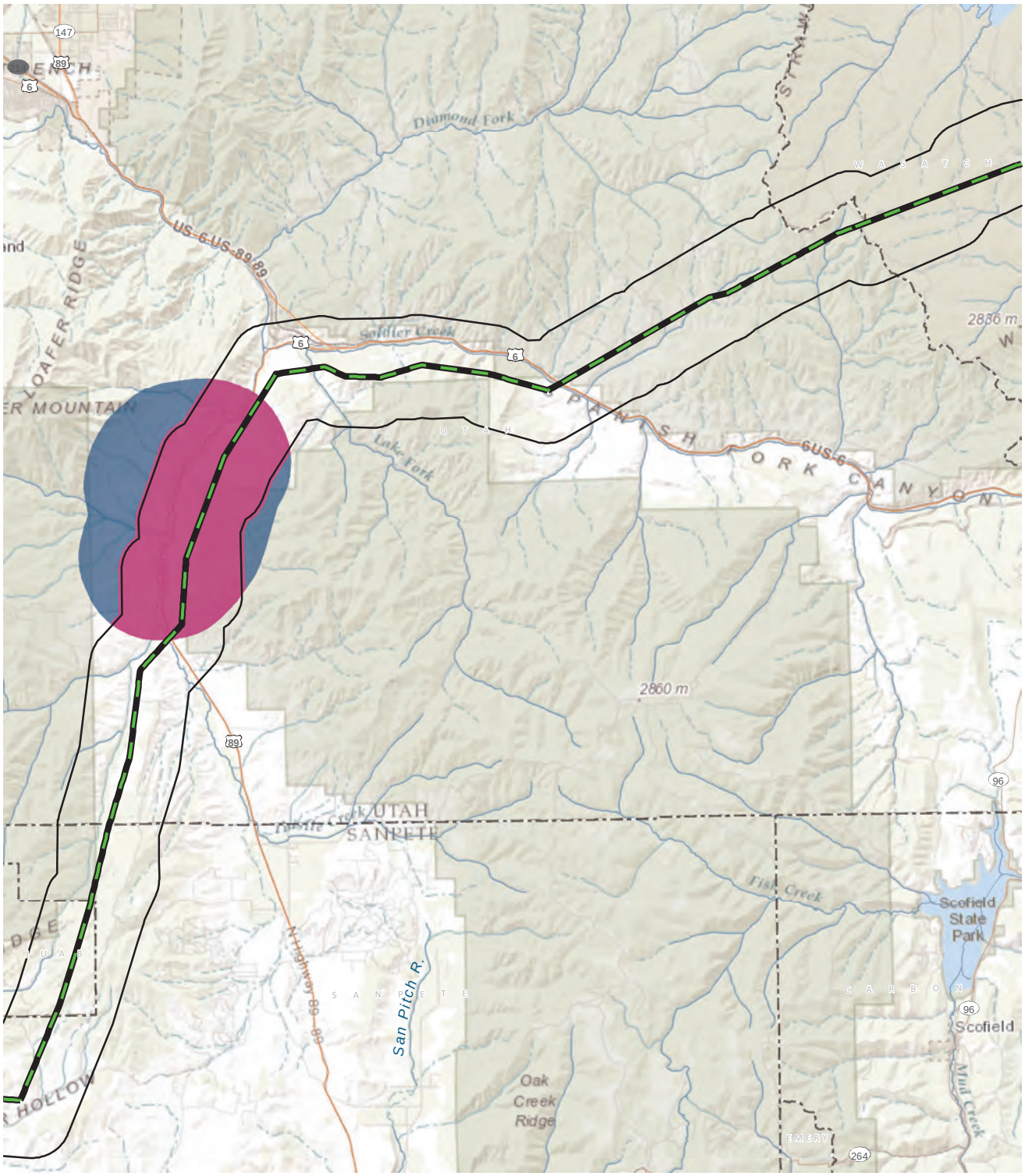
- Habitat and soil monitoring should be considered to determine the full extent of potential habitat and facilitate post-delisting monitoring.
- The post-delisting monitoring plan should include annual monitoring geared toward assessing the impacts of livestock grazing on the plants and habitat. Should unauthorized livestock begin to degrade the habitat, fencing should be installed between the UDWR and private lands.
- Should monitoring show that unauthorized livestock are beginning to degrade the habitat, fencing should be installed between the UDWR and private lands (USFWS 2011e).

Assessment of Effects

Area of Analysis

There is currently no accepted habitat model for Deseret milkvetch. The model previously used by the USFWS was determined to be inadequate when populations of the plant were found outside of the modeled habitat area. Consequently, until a new habitat model can be developed and vetted by the USFWS, the agency is using a 2-mile buffer around known occurrences to define a general habitat area for this species (**Figure 6-15**). The north and south boundaries of the analysis area are therefore based on this general habitat area. Within this area, which extends approximately 7 miles along the length of the proposed ROW, the lateral extent of the Deseret milkvetch analysis area is defined by the type of construction and maintenance activity that could occur there. For areas in which only temporary ground disturbance would occur, the analysis area consists of the proposed facility footprint with a 50-foot buffer. In areas where temporary or permanent ground disturbance (including mechanical vegetation treatments) would occur, a buffer of 300 feet would be applied to the direct disturbance footprint. In areas where permanent ground disturbance would take place upslope of suitable or occupied habitat, the buffer is extended to 400 feet from the edge of ground disturbance. Were herbicides to be used following initial vegetation clearing or during the operations and maintenance phase of the project, a buffer distance of 2,500 feet from the edge of disturbance would be applied.

K:\Projects_4\TransWestExpress\12907_003_Transwest_Express\Figures\DocumentFigures\2015_BA_v2\SSPlantsFig_6_15_DesertMilkvetch.mxd



- Proposed
- Action
- Analysis Area for Deseret Milkvetch
- Potential Habitat for Deseret Milkvetch

Action Area Buffer for Analysis Areas:
Deseret milkvetch - 400 feet

TRANSWEST EXPRESS TRANSMISSION PROJECT

Figure 6-15
Areas of Analysis for
Deseret Milkvetch

0 1 2 4 Miles
0 1 2 4 km
1:250,000

N

Western AREA POWER ADMINISTRATION

Exported On: 2/24/2015

The analysis area for Deseret milkvetch is defined as the spatial extent of the general habitat polygon within the Project disturbance areas, plus a 400-foot buffer. This analysis area is based on the following assumptions:

- Field surveys have not been conducted to verify the extent of suitable habitat; therefore, the use of the USFWS-delineated general habitat polygon has been applied as a conservative estimate of the extent of potentially suitable habitat.
- Site-specific locations of access roads have not been defined; therefore, it is assumed that ground disturbance could occur anywhere within the analysis area.
- TransWest has committed to avoiding herbicide use within 2,500 feet of occupied or suitable Deseret milkvetch habitat.

Within the analysis area, the species has been documented within the refined transmission corridor along US-89 near Birdseye, Utah. Currently, the species is not known to occur outside of this area. The nearest known plant to the preliminary engineered alignment is located approximately 1,700 feet west and downslope of the proposed line. Another record of occurrence is located approximately 130 feet from and downslope of Blind Canyon Road, the most likely route by which the transmission line ROW would be accessed in this area.

Conservation Measures

Impacts to Deseret milkvetch potential habitat would be minimized through implementation of the following design features and conservation measures described in Chapter 3.0:

- Applicant-committed mitigation measures and design features: TWE-1 – TWE-7, TWE-9 – TWE-13, TWE-19, TWE-22 – TWE-23, TWE-26 – TWE-27, TWE-29, TWE-31, TWE-33 – TWE-34, TWE-47, TWE-57 – TWE-62, and TWE-64.
- Conservation measures **NX-1, SS-1**, **SS-3**, **SS-4**, **SS-5**, **SS-6**, and **SS-9.**

In addition to these measures, the following species-specific conservation measure is proposed:

SS-7: To avoid and minimize impacts to the Deseret milkvetch, TransWest would coordinate with the BLM, USFS, and USFWS to implement appropriate mitigation measures during construction, including but not limited to:

1. If the Project can avoid all suitable habitat (as modeled) and occupied habitat (as documented) with a 300-foot buffer, no surveys are necessary. If avoidance of suitable habitat is not possible, surveys would be performed within 300 feet of the Project area to determine occupancy prior to construction or 400 feet if upslope of suitable or occupied habitat.
2. If surveys are necessary, they must be performed by qualified individual(s) and according to Service accepted survey protocols. Surveys would be conducted during the flowering and/or fruiting period when the plant can be detected and correctly identified. Surveys would be valid for one calendar year.
3. No new development or permanent ground disturbance, including but not limited to poles, pads, towers, etc., would occur within a 300 foot buffer of suitable or occupied Deseret milkvetch habitat. If construction activities occur upslope of suitable or occupied habitat, the buffer may be increased to 400 feet to prevent additional erosion within the habitat.
4. Wire would be strung between towers aerially with no ground disturbance in suitable or occupied Deseret milkvetch habitat.

5. No new roads would be established within a 300-foot buffer of suitable or occupied Deseret milkvetch habitat. If construction activities occur upslope of suitable or occupied habitat, the buffer may be increased to 400 feet to prevent additional erosion within the habitat.
6. Existing access roads would be utilized to the extent practicable to limit additional fragmentation within the species' habitat from new road development.
7. The existing access road to the north of Birdseye that connects to Blind Canyon Road contains plants alongside the road and within 300 feet of the road edge. If this road would be used, formal consultation that incorporates the following conservation measures is recommended:
    a. Existing road sections where the plants occur would not be bladed or widened.
    b. A 300-foot buffer would be maintained between the edge of disturbance from blading or widening activities and individual plants. Widening of existing roads would not occur if occupied habitat is immediately upslope or downslope of the existing road.
    c. This road would not be used during the flowering period of Deseret milkvetch, between May 1 and June 30 to minimize the impact of dust on pollination and reproduction.
    d. This road may be used during the active growing season, outside the flowering period: March 1 - April 30 and July 1 - August 31. During these time periods, dust abatement would be employed during all phases of construction, maintenance, and operation.
8. For the existing road to the south of Birdseye, if plants are found within 300 feet of the road edge, formal consultation that incorporates the conservation measures identified in #7 is recommended.
9. Occupied Deseret milkvetch habitats within 300 feet of the edge of newly installed roads, poles, pads, towers, etc. shall be monitored for a period of 3 years after ground disturbing activities. Monitoring would include annual plant surveys to determine plant and habitat impacts relative to project facilities. Annual reports shall be provided to the Service and the UNHP.
10. All Project employees, including contractors, brought onsite for the duration of the construction project and ongoing maintenance activities would be informed of the occurrence of Deseret milkvetch in the project area and of the threatened status of the species. Maps with areas of avoidance, including buffers, would be provided to all employees accessing the project area. A qualified biologist or botanist is required to perform this instruction and update maps as necessary.
11. A qualified biologist or botanist must be on-site pre-construction to clearly mark or flag avoidance areas so they are visible during construction. The same qualified personnel would be present during construction to monitor avoidance of these areas. A post-construction report documenting compliance and non-compliance with these measures would be prepared by the qualified personnel and submitted to USFWS no later than 1 month post-construction.
12. All equipment would be cleaned and inspected for presence of invasive, non-native plants and seeds before being brought in suitable habitat.
13. Post-construction, the project would provide a GIS-shapefile or documentation of new and upgraded access routes to the appropriate emergency fire operations personnel with the State of Utah, the BLM, the USFS, and USFWS, as well as notification statement that there is a federally listed plant species within the area of Birdseye, Utah. This information would be provided no later than 1 year post-construction of this specific transmission line segment.
14. No vegetation treatments would be performed in suitable or occupied Deseret milkvetch habitat. In addition, the following buffers would be applied—300 feet buffer for mechanical vegetation treatments, 2,500 feet for herbicide treatments, and no aerial herbicide treatments.
15. Project disturbance within suitable habitat would not exceed 10 percent cumulatively.

Direct and Indirect Effects

The types of direct and indirect effects to Deseret milkvetch and its associated habitat resulting from construction, operation, and decommissioning of the Proposed Action would be similar to those presented above for clay phacelia.

Based on the current preliminary engineered alignment and the locations of known occurrences, temporary and permanent ground disturbances within the proposed ROW are not expected to affect this species. However, direct and indirect impacts to Deseret milkvetch could occur as a result of the populations' proximity to access roads. Should Blind Canyon Road be used to access the proposed ROW, there is potential for improvements to and use of this road to result in adverse effects on individual plants due to erosion/sedimentation and the generation of fugitive dust. Implementation of the Applicant-committed mitigation measures, design features, and general conservation measures listed above and conservation measure **SS-7** described above would result in the Project having no impact on Deseret milkvetch individuals. These measures also would result in the avoidance of impacts to potential Deseret milkvetch habitat outside of the ROW and the minimization of impacts to potential Deseret milkvetch habitat within the ROW.

Cumulative Effects

No reasonably foreseeable non-federal future actions have been identified within the vicinity of the Deseret milkvetch area of analysis.

Determination

Effect on the Species: The Proposed Action *may affect, but is not likely to adversely affect* Deseret milkvetch.

Effect on Critical Habitat: No critical habitat has been proposed or designated for Deseret milkvetch; thus, there would be *no effect* to critical habitat for this species.

*Rationale: Construction and operation of the Proposed Action would affect a relatively small portion of the Deseret milkvetch area of analysis. Prior to final engineering surveys, a habitat assessment would be conducted to determine whether suitable habitat occurs within the analysis area. If suitable habitat is found, and should it be necessary to site project facilities within that habitat, species-specific surveys using USFWS-approved protocols would be conducted. All occurrences of the species identified during this survey effort would be avoided by surface-disturbing activities. In addition, access roads and other Project facilities would be sited a minimum of 300 feet away from observed species locations. Implementation of the listed design features, general conservation measures, and conservation measure **SS-7**, would result in avoidance of Project-related impacts to Deseret milkvetch and minimization of or compensation for impacts to its habitat.*

6.1.5.3 Ute Ladies'-tresses Orchid (Threatened)

Environmental Baseline

Conservation Status

The Ute ladies'-tresses orchid (*Spiranthes diluvialis*) was listed as threatened pursuant to the ESA on January 17, 1992. No critical habitat has been proposed or designated for this species. A draft recovery plan for Ute ladies'-tresses was developed by the USFWS in 1995 but it has not been finalized. In 2005, a rangewide status review of the species was prepared by contractors on behalf of the USFWS and Central Utah Water Conservancy District.

Populations of Ute ladies'-tresses orchid are known from three broad general areas of the interior western U.S.: 1) near the base of the eastern slope of the Rocky Mountains in southeastern Wyoming and adjacent Nebraska as well as north central and central Colorado; 2) in the upper Colorado River

Basin, particularly the Uinta Basin; and 3) in the Bonneville Basin along the Wasatch Front and westward into the eastern Great Basin, north-central and western Utah, and extreme eastern Nevada and southeastern Idaho. The species also has been documented in southwestern Montana and in the Okanogan area and along the Columbia River in north-central Washington. During the 2004 status review, it was determined that there were 61 Ute ladies'-tresses populations recognized rangewide, 52 of which were extant at that time. Many populations have less than 100 individuals, though contain between 100 and 1,000 plants and a few populations have been estimated to contain between 1,000 and 30,000 plants (Fertig et al. 2005). The highest number of plants recorded in any 1 year was 38,438 in 1998, based on sampling 23 of the 55 populations known at that time. Because the sampled populations were not selected randomly, no useful extrapolations to estimate rangewide numbers from annual counts can be made (Fertig et al. 2005). Status and trends for individual populations can be found in the rangewide status review (Fertig et al. 2005).

Life History and Habitat Association

The species is riparian or wetland-dependent and typically occupies moist to very wet, somewhat alkaline or calcareous native meadows near streams, springs, seeps, lake shores, or abandoned streams that still retain ample groundwater. Elevations range from 4,200 to 7,000 feet amsl over the entire range of the species; however, in each state, the species is found at more specific elevation ranges (Fertig 2000; USFWS ECOS 2014b). Since its listing, Ute ladies'-tresses was known to exist primarily in moist meadows associated with perennial stream terraces, floodplains, and oxbows. In 1992, surveys determined that Ute ladies'-tresses also occupy seasonally flooded river terraces, sub-irrigated or spring-fed abandoned stream channels and valleys, and lakeshores. In addition, 26 populations have been discovered along irrigation canals, berms, levees, irrigated meadows, excavated gravel pits, roadside barrow pits, reservoirs, and other human-modified wetlands. Over one-third of all known Ute ladies'-tresses populations are found on alluvial banks, point bars, floodplains, or ox-bows associated with perennial streams. More than half of documented populations occur in sites where natural hydrology has been influenced by dams, reservoirs, or supplemental irrigation. Many populations occur within agricultural or urban settings (Fertig et al. 2005; USFWS ECOS 2014b).

Ute ladies'-tresses is a perennial herb with usually one erect, glandular-pubescent stem 4.5 to 24 inches tall arising from tuberous-thickened roots. Basal leaves are narrow, up to 0.4 inch wide and 11 inches long, and persist at the time of flowering. Leaves are arranged alternately and become progressively smaller moving up the stem. The inflorescence is sparsely pubescent spikes of numerous small white or ivory-colored flowers arranged in a gradual spiral. Individual flowers are 0.3 to 0.6 inch long and faintly fragrant. The lip petal is oval to lance-shaped, narrowed at the middle, and has wavy margins. Fruits are cylindric capsules with numerous seeds (USFWS ECOS 2014b).

The orchid appears to require moisture in the rooting zone, typically provided by a high groundwater table through the growing season and into late summer or early autumn. Ute ladies'-tresses orchid typically flowers from July to August, but can vary from late June to late September depending on the state/region (Fertig 2000; USFWS ECOS 2014b). Plants usually occur as small scattered groups and occupy relatively small areas within the riparian system.

Ute ladies'-tresses orchid most likely reproduces exclusively by seed; however, the presence of clustered plants could be the result of asexual reproduction from a single root mass or broken root segment. Such clusters also could be from seed caches or germination of seed from an entire buried fruiting capsule. The life cycle of the species consists of four main stages: seedling, dormant, vegetative, and reproductive (flowering or fruiting). Fruits are produced in late August or September with seeds shed shortly thereafter. As with other orchid species, Ute ladies'-tresses seeds are microscopic and readily dispersed by wind or water. Because of their minute size, the seeds contain little stored food to sustain embryos and are probably short-lived in the soil. Recent attempts to germinate seeds in a lab demonstrated it took up to 1.5 years for germination to occur. It is hypothesized that germinated seedlings must quickly establish a symbiotic relationship with mycorrhizal soil fungi in order to survive.

The absence or rarity of appropriate fungal symbionts in the soil could be a major factor limiting the establishment of new Ute ladies'- tresses populations (USFWS ECOS 2014b).

New vegetative shoots are produced in October and persist through the winter as small rosettes. These resume growth in the spring and develop into short-stemmed, leafy plants. Depending on site productivity and conditions, vegetative shoots can remain in this state all summer. Vegetative individuals die back in the winter to subterranean roots or persist as winter rosettes. Ute ladies'-tresses blooms from early July to late October and flowering typically occurs earlier where there is an open canopy (USFWS ECOS 2014b).

Bees are the primary pollinators of Ute ladies'-tresses, particularly solitary bees in the genus *Anthophora*, bumblebees (genus *Bombus*), and occasionally non-native honeybees (*Apis mellifera*). Of these species, *Anthophora terminalis* is apparently the most effective pollinator, with studies showing orchids pollinated by *A. terminalis* produce three times as many fruits as plants pollinated only by *Bombus* species (USFWS ECOS 2014b). Long-term monitoring studies indicate that the abundance and composition of the bee fauna varies from year-to-year, thus impacting overall fruit production. Other insects such as Syrphid flies, skippers, and members of the *hymenopteran* genera have been observed visiting the orchid for nectar. However, they are too small or improperly shaped to function as effective pollen vectors (USFWS ECOS 2014b).

Threats

Current threats to the species include grazing, loss of wetland and riparian habitat, fragmentation as a result of noxious weed species invasion, and shifts in hydrologic regimes. Additional threats to the species include habitat modification; over-collection; herbicide drift; recreational activities; mowing; herbivory; loss of pollinators; drought; and loss of mycorrhizal symbionts.

When Ute ladies'-tresses orchid was listed, the USFWS identified habitat loss and modification (through urbanization, water development, and conversion of wetlands to agriculture), over-collection, competition from exotic weeds, and herbicide application as the main threats to the survival of Ute ladies'-tresses. Since listing in 1992, other threats have been identified including impacts from recreation; mowing for hay production; grazing by cattle or horses; herbivory by native wildlife (particularly voles); reduction in the number and diversity of insect pollinators; drought; absence or rarity of mycorrhizal symbionts; and conflicting management with other rare species (USFWS ECOS 2014b). It has been demonstrated that mowing in conjunction with winter grazing can actually have a positive effect on Ute ladies'-tresses by reducing competing vegetative cover and protective cover for voles (USFWS ECOS 2014b).

Recovery

In 1995, the USFWS published the *Draft Ute Ladies-Tresses Agency Review Draft Recovery Plan*. As stated above, this recovery plan has not been finalized. The *Rangewide Status Review of Ute Ladies'-Tresses* (*Spiranthes diluvialis*) was published in September 2005 (Fertig et al. 2005).

Assessment of Effects

Area of Analysis

The analysis area for Ute ladies'-tresses orchid is defined as the spatial extent of potential habitat within the Project disturbance areas, plus a 300-foot lateral and upstream buffer and a 1,320-foot (0.25-mile) downstream buffer. This analysis area is based on the following assumptions:

- Field surveys have not been conducted to verify the extent of suitable habitat; therefore, modeled potential habitat has been used to conduct the effects analysis in this BA under the conservative assumption that all modeled habitat is occupied.
- Site-specific locations of access roads have not been defined; therefore, it is assumed that ground disturbance could occur anywhere within the analysis area.

Although the Project traverses modeled Ute ladies'-tresses habitat in multiple locations, the only known population of the species in the vicinity of the analysis area is located in Uintah County, Utah, where a population has been documented approximately 2,000 feet north (and upstream) of the analysis area.

Conservation Measures

Impacts to Ute ladies'-tresses orchid potential habitat would be minimized through implementation of the following design features and conservation measures described in Chapter 3.0:

- Applicant-committed conservation measures and design features: TWE-1 – TWE-7, TWE-9 – TWE-13, TWE-19, TWE-22, TWE-23, TWE-26–TWE-27, TWE-29, TWE-31, TWE-33 – TWE-34, TWE-47, TWE-57 – TWE-62, and TWE-64.
- Conservation measures: **NX-1, SS-1**, **SS-3**, **SS-4**, **SS-5**, **SS-6**, and **SS-9.**

In addition to these measures, the following species-specific conservation measure would be implemented:

- **SS-2**: (Avoidance of Ute ladies'-tresses orchid species and habitat) – Known individuals and populations and areas identified as suitable habitat through consultation with the USFWS would be spanned by the transmission line. Surface disturbance associated with facilities, access roads, and other Project-related construction activities would not occur within the areas identified as suitable habitat or as having known occurrences. A minimum 300-foot lateral and upstream buffer distance and a 1,320-foot downstream buffer would be observed between areas of surface disturbance and known occurrences. Presence of species in modeled habitat is assumed for ESA Section 7 consultation purposes. If potential habitat cannot be avoided, 3 years of surveys in potential habitat would be required and formal consultation may be necessary.

Direct and Indirect Effects

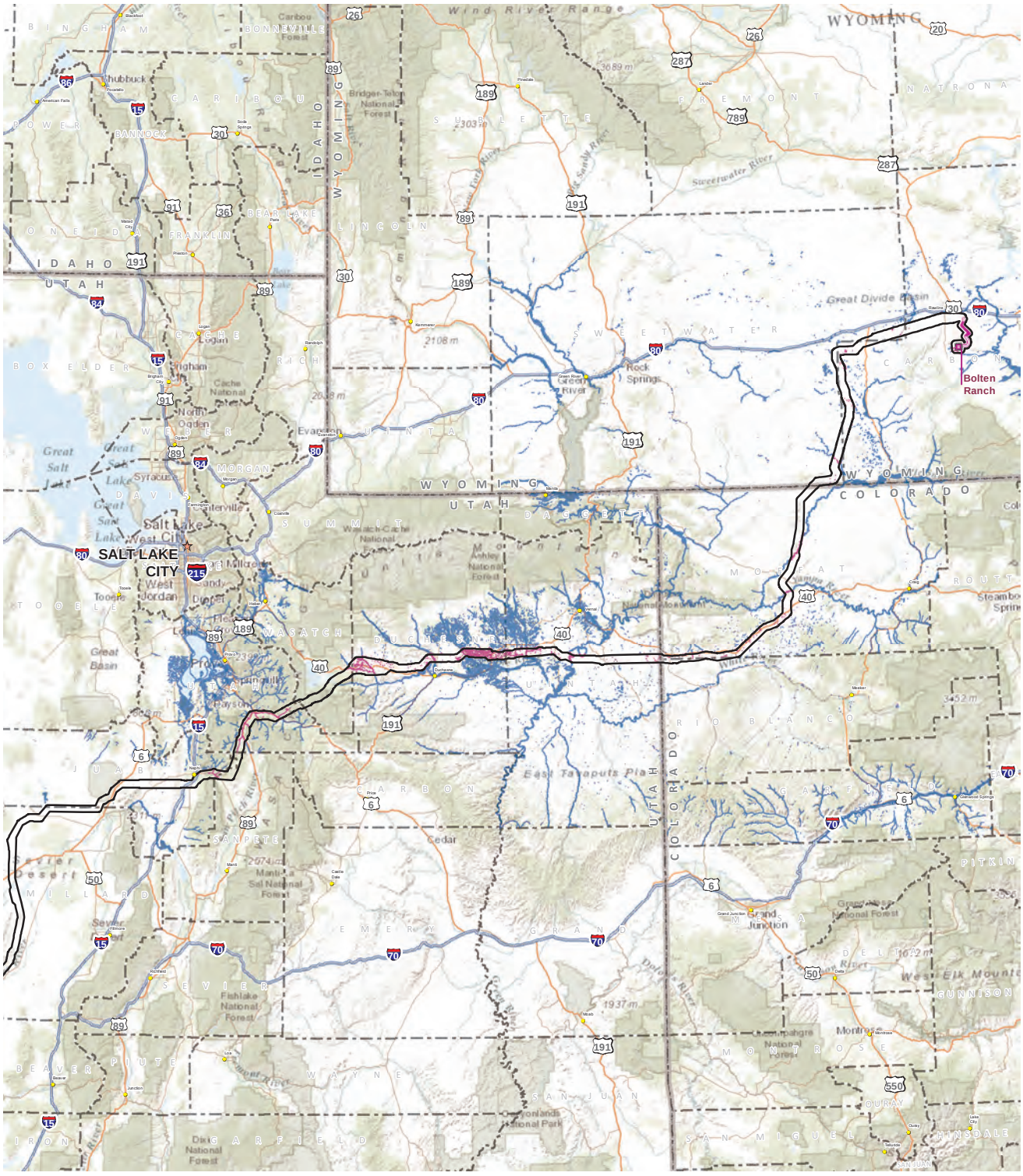
Habitat modeling indicates that approximately 5,619 acres of potential habitat have been identified within the analysis area (**Figures 6-16** and **6-17**). Based on the preliminary engineered alignment, the nominal span distance of the transmission line, and the estimation of transmission line structures required in this area, approximately 81 acres (1.4 percent) of potential habitat within the analysis area could be directly impacted by the Proposed Action. Site- and species-specific surveys within potential habitat would further refine this value and potentially reduce the estimated acreage of impacts to habitat. Whereas the Proposed action would affect modeled Ute ladies'-tresses habitat, it would have no effect on any known populations of the species.

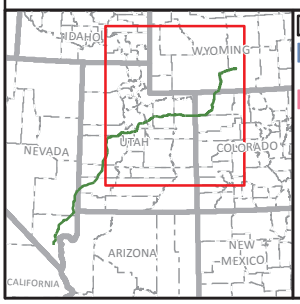
Site-specific locations of access roads within the analysis area have not been defined; therefore, it is assumed that ground disturbance could occur anywhere within the analysis area and the area of potential impact accounts for estimated road disturbance. In reality, TransWest would use existing roads to access either side of large streams and wetlands, minimizing disturbance to potential Ute ladies'-tresses habitat.

With implementation of the Applicant-committed mitigation measures and design features and the general and species-specific conservation measures listed above, impacts to Ute ladies'-tresses and its habitat are expected to be avoided. Pre-construction surveys would identify extant plants and occupied habitats and allow TransWest to micro-site facilities and/or use special construction practices (as defined in Section 5.7 of the POD (Final EIS Appendix D)) to avoid direct impacts to this species and its habitat.

No critical habitat has been proposed or designated for this species; therefore, no impacts to critical habitat would occur.

K:\Projects_4\TransWestExpress\12907_003_Transwest_Express\Figures\DocumentFigures\2015_BA_v2\SSPlantsFig_6_16_UteLadiesTressesOrchid_Map01.mxd





Action Area

Potential Habitat for Ute Ladies'-Tresses Orchid

Analysis Area

TRANSWEST EXPRESS TRANSMISSION PROJECT

Figure 6-16
Region I and II
Area of Analysis for
Ute Ladies'-Tresses Orchid

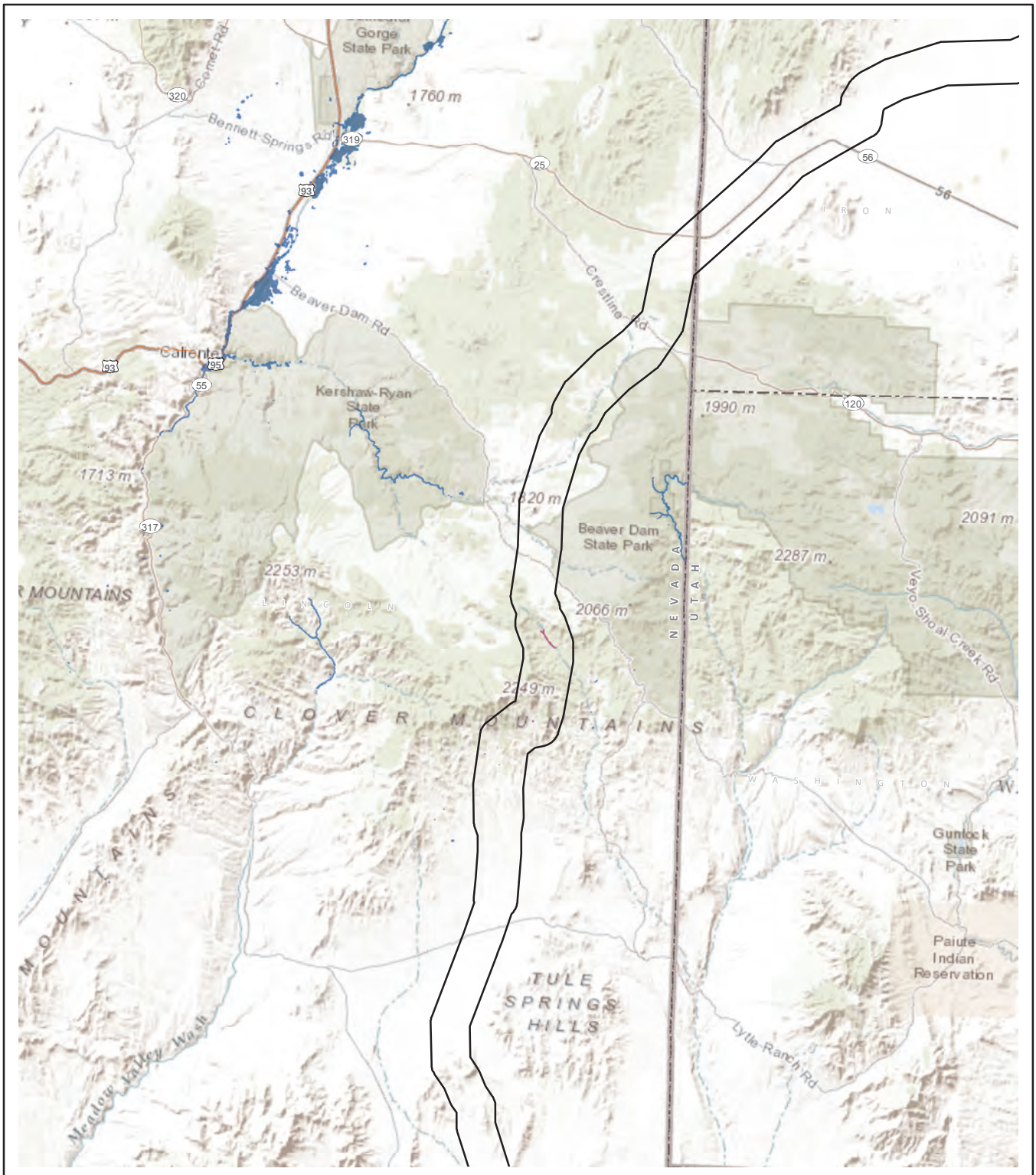
0 10 20 40 Miles
0 10 20 40 km
1:3,000,000

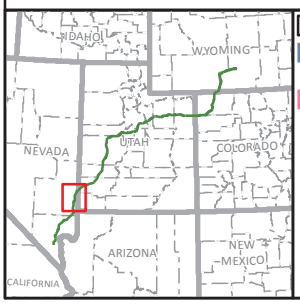
N

Western AREA POWER ADMINISTRATION

Exported On: 2/27/2015

K:\Projects_4\TransWestExpress\12907_003_Transwest_Express\Figures\DocumentFigures\2015_BA_v2\SSPlantsFig_6_17_UteLadiesTressesOrchid_Map02.mxd





- Action Area
- Potential Habitat for Ute Ladies'-Tresses Orchid
- Analysis Area

TRANSWEST EXPRESS TRANSMISSION PROJECT

Figure 6-17
Region III
Area of Analysis for
Ute Ladies'-Tresses Orchid

0 2 4 8 Miles
0 2 4 8 km
1:500,000
N

Western AREA POWER ADMINISTRATION

Exported On: 2/27/2015

Cumulative Effects

No reasonably foreseeable non-federal future actions have been identified within the vicinity of the Project action area.

Determination

Effect on the Species: The Proposed Action *may affect, but is not likely to adversely affect* Ute ladies'-tresses orchid.

Effect on Critical Habitat: No critical habitat has been proposed or designated for this species; thus, the Proposed Acton would have no effect on critical habitat for Ute ladies'-tresses.

Rationale: Construction and operation of the Proposed Action would affect a relatively small portion of potentially suitable Ute ladies'-tresses habitat within the analysis area. This habitat would be surveyed for Ute ladies'-tresses prior to final engineering and construction and the proposed facility locations would be micro-sited to avoid field-verified suitable habitat. Suitable habitat would then be spanned by the transmission line, avoiding any ground disturbance through the use of special construction practices, if needed. Although unlikely, if the planned locations of tower structures, access roads, or other project facilities cannot be sited to avoid suitable habitat, then species-specific surveys would be conducted around areas proposed for surface disturbance using USFWS-approved survey protocols. Any Ute ladies'-tresses individuals found during this survey effort would be avoided by 300 feet where they occur upstream and to the sides of the crossing and by 1,320 feet downstream of the crossing. If these buffer distances could not be maintained, then formal consultation would be initiated with the USFWS.

6.1.5.4 Barneby Ridgecress (Endangered)

Environmental Baseline

Conservation Status

The Barneby ridgecress, was listed as endangered under the ESA on September 28, 1990 (55 FR 39860). Critical habitat has not been designated for this species. The USFWS initiated a 5-year review of the species on October 6, 2008 (73 FR 58261).Critical habitat has not been designated for this species.

Life History and Habitat Association

The species is a perennial herb found within pinyon-juniper communities on poorly developed soils derived from the marly shale outcrops in a zone of interbedding geologic stratas from the Uinta and Green River formations. Populations are found between 6,200 and 6,500 feet amsl and flowering occurs in early May (USFWS 1993). Barneby ridgecress is an herbaceous perennial in the mustard family. It grows between 2 and 6 inches tall and up to 8 inches wide (USFWS 2012). The stems are smooth with narrow leaves clustering at the base of the plant. The Barneby ridgecress blooms in May with cream-colored flowers that are about 0.25 inch across. Barneby ridgecress is endemic to the Indian Canyon drainage, which is mainly on Ute Tribal lands, and grows with other mound-forming species in pinyon-juniper communities.

Threats

Threats to the species include oil and gas activities, off-road vehicles, and trampling from livestock grazing. Other factors that may have negatively impacted the species included low rates of seed maturity and its restricted range (USFWS 2012). The species' reproductive fitness and ability to adapt to environmental changes remain a concern. Because of its restricted range, this species is remains vulnerable to stochastic events. Invasive weeds that occur within Barneby ridgecress habitat or have potential to become established within the species restricted range may become a threat to this species.

Recovery

In July 1993, the USFWS published a recovery plan that lists necessary actions to recover the species, although no delisting criteria were designated at the time, criteria for down listing of the species was specified. Recovery Plan down-listing criteria include achieving:

- Discovery of additional stands through additional surveys or through the introduction of additional stands within suitable habitat proximal to the known species range.
- A population consisting of a total of 5 separate stands of at least 2,000 individuals each and an overall total of 20,000 individuals.
- Develop and apply formal land conservation designations to protect the species and its habitat.

In July 2011, The USFWS published a 5-year review to evaluate whether or not the species' status has changed since it was listed and to determine if down listing criteria had been met. This 5-year review was drafted by the species' lead botanist in the Utah Ecological Services FO and provides a summary and analysis of information provided in the 1993 Barneby Ridge-cress Recovery Plan (USFWS 1993), current scientific research, and surveys related to the species. The 5-year review concluded that none of the down listing criteria had been met. The primary objective of the 1993 Recovery Plan was to maintain a viable population of Barneby ridge-cress at its only known location. The 5-year review found that maintaining a viable population could be accomplished by ensuring the following:

- Protection of the species' current known population and occupied habitat in all three of its known stands by enforcing the conservation provisions of Sections 7 and 9 of the ESA;
- Establishing formal land designations to conserve and protect the habitats at each of the three stands to ensure their long term protection primarily from oil and gas development actions and OHV activities; and
- Initiate conservation measures which may lead to down listing of the species to threatened status.

The 5-year review also recommended the following future actions be conducted in coordination with Ute Tribal representatives and the Bureau of Indian Affairs:

- Conduct population surveys within the species' known range and potential habitat in the general region (Uinta Basin of northeastern Utah) to better understand the species' range, abundance and potential threats. Comprehensive surveys conducted in 2010 and 2011 identified 4,082 plants. This is population level is below the 20,000 plants needed to meet down listing criterion;
- Conduct populations monitoring to determine natural population dynamics and trends and avoid impacts to the species' habitat from oil and gas development and other possible threats;
- Conduct research of the species' life history including reproduction;
- Ensure that the Section 7(a)(2) process addresses threats posed by invasive plants, dust, habitat fragmentation from road development and other indirect impacts from oil and gas development;
- Evaluate the potential to establish a conservation area or a management plan to protect the species in perpetuity; and
- Investigate the species' response to climate factors by collecting the appropriate data during monitoring and by compiling relevant information from surrogate species.

Assessment of Effects

Area of Analysis

The analysis area consists of a 300-foot buffer applied to the Project action area where it traverses modeled potential habitat for Barneby ridgecress northeast of Starvation Reservoir in Duchesne County, Utah (**Figure 6-18**). The analysis area is located on private land and has been highly fragmented by oil and gas development and associated well pads, access roads, and pipeline routes. The only known occurrences of this species are from three ridges near Indian Canyon on the Uintah and Ouray Reservations of the Ute Indian Tribe, approximately 4.5 miles south of the analysis area (USFWS 1993).

Conservation Measures

Impacts to Barneby ridgecress potential habitat would be minimized through implementation of the following design features and conservation measures described in Chapter 3.0:

- Applicant-committed conservation measures and design features: TWE-1 – TWE-7, TWE-9 – TWE-13, TWE-19, TWE-22, TWE-23, TWE-26–TWE-27, TWE-29, TWE-31, TWE-33 – TWE-34, TWE-47, TWE-57 – TWE-62, and TWE-64.

Conservation measures: **NX-1**, **SS-1**, **SS-3**, **SS-4**, **SS-5**, **SS-6**, and **SS-9.**

Direct and Indirect Effects

Habitat modeling indicates that approximately 106 acres of potential habitat have been identified within the analysis area (**Figure 6-18**). Based on the preliminary engineered alignment, the nominal span distance of the transmission line, and the estimation of transmission line structures required in this area, approximately 76 acres of potential habitat within the analysis area would be directly impacted by the Proposed Action. Site- and species-specific surveys within potential habitat would further refine this value and potentially reduce the estimated acreage of impacts to habitat. The Project would affect modeled habitat but would have no effect on any known populations.

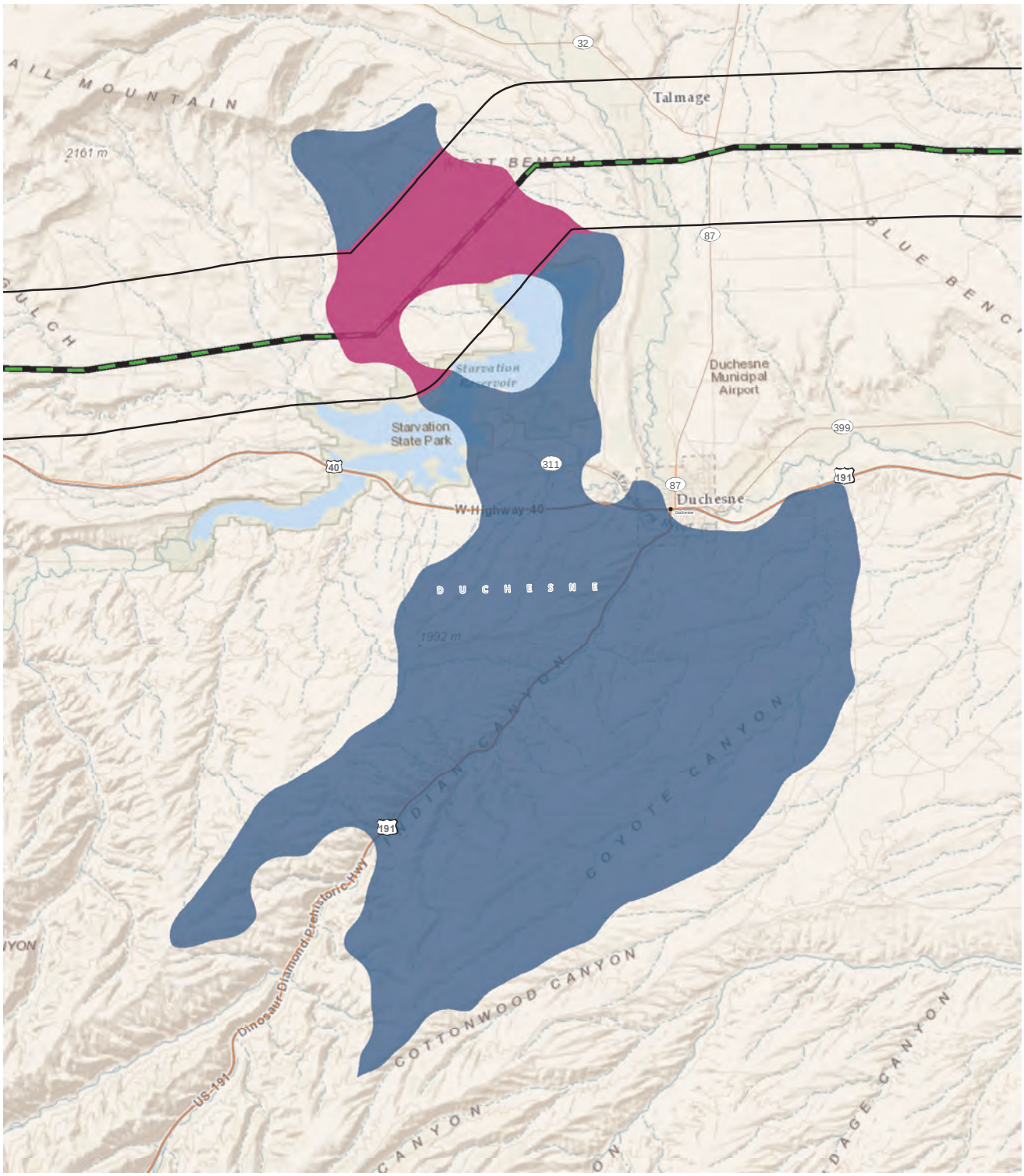
Site-specific locations of access roads within the analysis area have not been defined; therefore, it is assumed that ground disturbance could occur anywhere within the analysis area and the area of potential impact accounts for estimated road disturbance. In reality, TransWest would use existing roads to access the ROW through this area and these roads are plentiful due to the level of oil and gas development within and immediately adjacent to the Barneby ridgecress analysis area.

With implementation of the Applicant-committed mitigation measures and design features and the general conservation measures listed above, impacts to Barneby ridgecress and its habitat are expected to be avoided. A habitat assessment conducted prior to final engineering design would allow for planned tower locations, access roads, and temporary work areas to be sited outside of field-verified suitable habitat where possible. If planned impacts to suitable habitat are unavoidable, species-specific surveys would be conducted in accordance with USFWS-approved protocols. If plants are found in the area facility locations would be moved to avoid surface disturbance within 300 feet of documented species occurrences and special construction practices would be used, if necessary, to further ensure that impacts to extant individuals and suitable habitat are avoided.

Cumulative Effects

The Barneby ridgecress analysis area is located on private land upon which there is a high degree of existing oil and gas development. To the extent that additional in-fill development occurs in the future, there is potential for cumulative effects to Barneby ridgecress. No other reasonably foreseeable non-federal actions have been identified within the vicinity of the Barneby ridgecress analysis area.

K:\Projects_4\TransWestExpress\12907_003_Transwest_Express\Figures\DocumentFigures\2015_BA_v2\SSPlants\Fig_6_18_BarnebyRidgecress.mxd



- Proposed Action
- Action Area
- Analysis Area for Barneby Ridgecress
- Potential Habitat for Barneby Ridgecress

Action Area Buffer for Analysis Areas:
Barneby Ridgecress - 300 feet

TRANSWEST EXPRESS TRANSMISSION PROJECT

Figure 6-18
Area of Analysis for
Barneby Ridgecress

0 0.5 1 2 Miles
0 0.5 1 2 km
1:150,000
N

Western AREA POWER ADMINISTRATION

Exported On: 3/2/2015

Determination

Effect on the Species: The Proposed Action *may affect, but is not likely to adversely affect* Barneby ridgecress.

Effect on Critical Habitat: No critical habitat has been proposed or designated for this species; thus, the Proposed Action would have *no effect* on critical habitat for this species.

Rationale: Construction and operation of the Proposed Action would affect a relatively small portion of potentially suitable Barneby ridgecress habitat within the analysis area. This habitat would be surveyed for Barneby ridgecress habitat and, if necessary, individuals prior to final engineering and construction. Any plants found within 300 feet of the proposed facility locations would be avoided through facility micro-siting and, if necessary, the use of special construction practices.

6.2 Species Proposed for Listing (Including EXP/NE)

6.2.1 Mammals

6.2.1.1 Black-footed Ferret (Endangered; EXP/NE)

Environmental Baseline

Conservation Status

The black-footed ferret was listed as endangered under the ESA on June 2, 1970 (35 FR 8491). The USFWS initiated a 5-year species status review for the black-footed ferret on July 7, 2005 (70 FR 39326). In the 2008 status review summary, the USFWS recommended no change in status and a Recovery Priority Number of 2C (USFWS 2008c). Any black-footed ferrets that could occur along the proposed Project would be considered part of a 10j population. No self-sustaining ferret populations (endangered status) would be expected in the Project disturbance areas. No critical habitat is designated for proposed species. The initial Black-footed Ferret Recovery Plan was approved in 1978 and revised in 1988 (USFWS 1988a). The 1998 Revised Recovery Plan was drafted when no extant, wild black-footed ferrets were known to exist (USFWS 1988a). The current version of the Recovery Plan was issued in April 2013 (USFWS 2013h).

The black-footed ferret is endemic to North America. Historically, this species was probably common; however, its inconspicuous habits (nocturnal and fossorial) probably made it difficult to observe (USFWS 2013h). With no documentation of breeding outside of prairie dog colonies, it is believed that historical distribution of the black-footed ferret coincided with the ranges of the black-tailed prairie dog, Gunnison's prairie dog, and white-tailed prairie dog. These species collectively occupied approximately 100 million acres throughout the Great Plains, mountain basins, and semi-arid grasslands of North America, extending across 12 states (Arizona, Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, Utah, and Wyoming) and the Canadian provinces of Alberta and Saskatchewan (Anderson et al. 1986; Hillman and Clark 1980).

Approximately 562 million acres of potential black-footed ferret habitat once existed in the U.S. Ferrets might have been distributed with 85 percent in black-tailed prairie dog habitat, 8 percent in Gunnison's prairie dog habitat, and 7 percent in white-tailed prairie dog habitat (USFWS 2013h).

From the late 1800s to approximately 1960, both prairie dog occupied habitat and prairie dog numbers were reduced due to habitat destruction from conversion of native prairie to cropland, poisoning, and disease. Because the black-footed ferret is closely associated with prairie dog colonies, the reduction in prairie dog numbers has been an important factor in the precipitous decline of the species (Biggins et al. 2006). The population of wild black-footed ferrets was so decimated by the 1960s that it was considered to be extinct before a small population was located in South Dakota, in 1964 (USFWS 2008c). Failed captive breeding attempts subsequently led to the species' presumed extinction in 1979, when the last captive animal died. However, a remnant population was discovered in Meeteetse, Wyoming, in 1981.

These ferrets were removed from the wild between 1985 and 1987, and used to initiate a captive breeding program. Of the 18 remaining ferrets captured from Meeteetse, seven produced a captive population lineage that is the foundation of present recovery efforts. Extant populations, both captive and reintroduced, descend from these "founder" animals (USFWS 2013h).

USFWS estimates that the average minimum number of breeding adult ferrets currently in the wild is approximately 364 animals, with a minimum of 270 of those animals at self-sustaining sites. Four reintroduction sites (Aubrey Valley, Arizona; Cheyenne River Reservation, South Dakota; Conata Basin, South Dakota; and Shirley Basin, Wyoming) are currently considered to contain self-sustaining black-footed ferret populations.

Critical habitat has not been designated for the black-footed ferret.

Life History and Habitat Association

Black-footed ferrets are prairie dog obligates and prairie dog colonies are the only known habitat that sustains black-footed ferret populations (Biggins et al. 2006). Prairie dog colonies are typically found in short and mid-grass prairies, and semi-desert areas with mosaics of grass and shrubs (Esch et al. 2005). Ferret occupied prairie dog colonies are typically on level ground or rolling hills. Suitable soils include clay-loam to unconsolidated gravelly soils, which are more stable for burrow construction by prairie dogs and provide good drainage (Esch et al. 2005). Vegetation is typically a type of wheatgrass-needlegrass, including buffalo grass, blue grama, western wheatgrass, green needlegrass, and patches of forbs and mixed shrubs such as sagebrush and rabbit brush (Esch et al. 2005).

Ferrets prey on prairie dogs almost exclusively, and depend on prairie dog burrows for thermal cover, predator escape, hunting sites, parturition sites, and rearing of young (Esch et al. 2005). One study found that prairie dog remains constituted 91 percent of analyzed ferret scat (Hillman and Clark 1980). Other prey animals include ground squirrels, cottontail rabbits, deer mice, and possibly birds (NatureServe 2012). It has been estimated that approximately 100 to 150 acres of prairie dog colony are needed to support 1 ferret (Esch et al. 2005). The minimum area required to sustain a ferret is 91 to 235 acres in black-tailed prairie dog habitat (38 prairie dogs/acre), and 413 to 877 acres in white-tailed prairie dog habitat (10 prairie dogs/acre) (Esch et al. 2005), indicating a rather strong and predictable relationship between ferret area requirements and prairie dog density.

Black-footed ferrets typically begin breeding at 1 year of age and breeding occurs from mid-March through early April. Dens are located in prairie dog burrows. Gestation is approximately 42 to 45 days, and litter size is typically three to four kits (Hillman and Clark 1980). Young approach adult size and typically appear aboveground in July and disperse in September or October. Longer movements (0.6 to 4.3 miles) are traversed by males, whereas females typically remain on their natal colony (Miller et al. 1996). The fall dispersal of young ferrets suggests that some movements could be extensive. Ferrets are less active in winter, and are solitary animals except during the breeding season and in early spring (Hillman and Clark 1980).

There is little information on ferret life expectancy. Mustelids typically have short life expectancies and high (50 percent or greater) juvenile mortality (USFWS 2013h). The high mortality rate among young ferrets might occur during fall dispersal if they were to travel long distances before relocating in other prairie dog colonies (Hillman and Clark 1980). Many avian and mammalian predators are attracted to prairie dog colonies where ferrets could be encountered. Studies suggest that coyote, golden eagle, and great horned owls (as well domestic cats and dogs) opportunistically prey on black-footed ferrets (Hillman and Clark 1980). Ferrets also are susceptible to parasites and disease. Sylvatic plague and canine distemper could pose a serious threat to ferret populations in areas where outbreaks occur among other wild and domestic animals (Hillman and Clark 1980).

Threats

Black-footed ferret populations have declined for three principal reasons. In the late 1800s, a major conversion of native range to cropland began, particularly in the eastern portion of the species' range. In the early 1900s, farmers and ranchers began to poison prairie dogs as a means of reducing competition with domestic livestock for forage. Sylvatic plague, a non-native disease, first impacted prairie dogs in the 1930s. Each of these threats resulted in a substantial loss of prairie dogs, which in turn led to an even greater decline in ferret populations. Even a temporary loss of prairie dog habitat can result in a decline in ferret populations (USFWS 2013h).

While prairie dog occupied habitat declined (approximately 96 percent of historic occupancy) due to conversions of native prairie to cropland, poisoning, and disease during the 19th and first half of the 20th Century, prairie dog habitat has increased approximately 250 percent since mid-century. However, ferrets have been largely unable to successfully repopulate expanding prairie dog habitat. Therefore, current threats that hinder the recovery of black-footed ferrets are primary disease (sylvatic plague and canine distemper); poisoning (primarily anticoagulant rodenticides such as chlorophacinone [Rozol] and diphacinone [Kaput]); recreational prairie dog shooting; inadequate management of prairie dogs; and genetic fitness (USFWS 2013h).

Recovery

The USFWS assigned the black-footed ferret a recovery priority number of 2C on a scale of 1C-18, with 1C equaling the highest priority. This number indicates that the species faces a high degree of threat due to potential economic conflicts regarding the ferret's obligatory dependence on prairie dogs, which are viewed as pests by some parties (USFWS 2008c). The high degree of threat is largely due to inadequate management and conservation of prairie dogs.

According to USFWS the recovery of black-footed ferrets will depend upon: 1) the continued efforts of captive breeding facilities to provide animals of suitable quality and quantity for release into the wild, 2) the conservation of prairie dog habitat adequate to sustain ferrets in several populations distributed throughout their historical range, and 3) the management of sylvatic plague to minimize impacts to ferrets at reintroduction sites (USFWS 2013h).

- Conserve and manage a captive breeding population of black-footed ferrets with a minimum of 280 adults (105 males and 175 females) distributed among multiple facilities (minimum of 3);
- Establish free-ranging black-footed ferret populations totaling at least 1,500 breeding adults, in 10 or more populations in at least 6 of 12 states within the historic range of the species, with no fewer than 30 breeding adults in any population, and at least 3 populations within Gunnison's and white-tailed prairie dog colonies;
- Maintain these population objectives for at least three years prior to downlisting; and
- Maintain approximately 247,000 acres of occupied prairie dog habitat at reintroduction sites by planning and implementing actions to manage plague and conserve prairie dog populations.

Delisting criteria have been updated since the 1988 Black-footed Ferret Recovery Plan. Delisting could occur when the following recovery criteria are met:

- Conserve and manage a captive breeding population of black-footed ferrets with a minimum of 280 adults (105 males and 175 females) distributed among multiple facilities (minimum of 3);
- Establish free-ranging black-footed ferret populations totaling at least 3,000 breeding adults, in 30 or more populations; with at least 1 population in each of at least 9 of 12 states within the historical range of the species; with no fewer than 30 breeding adults in any population; at least 10 populations with 100 or more breeding adults; and at least 5 populations within Gunnison's or white-tailed prairie dog colonies;

- Maintain these population objectives for at least 3 years prior to delisting;
- Maintain approximately 494,000 acres of occupied prairie dog habitat at reintroduction sites by planning and implementing actions to manage plague and conserve prairie dog populations; and
- Complete and implement a post-delisting monitoring plan, in cooperation with the states and tribes, to ensure recovery goals are maintained.

The ultimate goal of the 2013 Recovery Plan is to recover the black-footed ferret such that it no longer meets the ESA definition of threatened and can be removed from the Federal List of Endangered and Threatened Wildlife (i.e., delisted). The USFWS believes that downlisting of the black-footed ferret could be accomplished in approximately 10 years if conservation actions continue at existing reintroduction sites and if additional reintroduction sites are established. The USFWSs downlisting goal of establishing 1,500 breeding adult black-footed ferrets by 2020 will require significant population expansion at existing sites where habitat is unfilled and/or reintroduction into new sites. The addition of approximately 1,300 breeding adult ferrets in populations with 30 or more breeding adults would require large population increases at most existing sites (USFWS 2013h).

Assessment of Effects

Area of Analysis

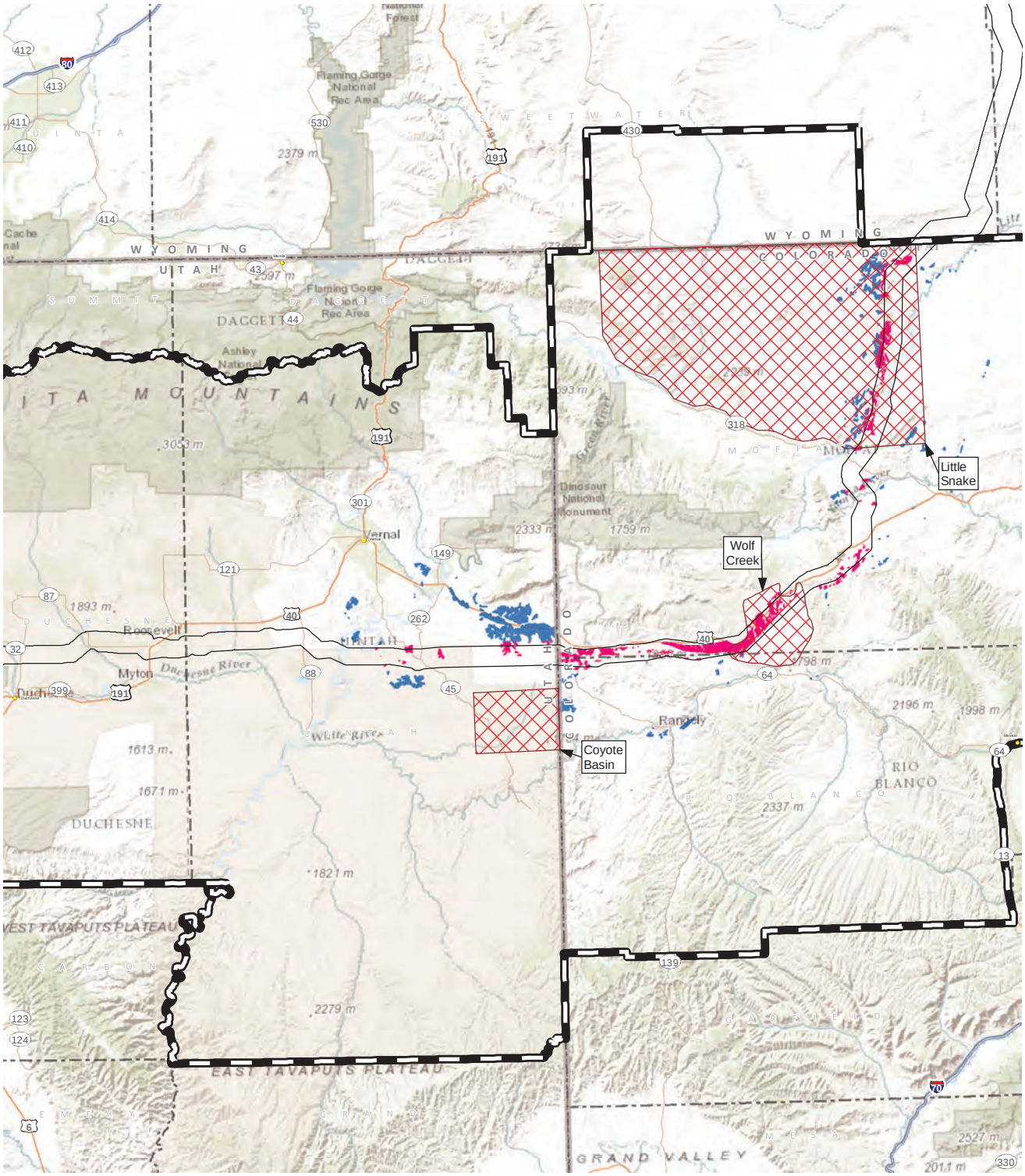
The black-footed ferret analysis area is defined as white-tailed prairie dog colonies within the 250-foot ROW, plus a 0.5-mile buffer around the action area. The action area is defined in Section 2.2. These areas represent approximately 24,275 acres of potential black-footed ferret habitat and are depicted in **Figure 6-19**.

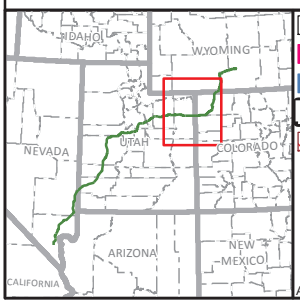
The black-footed ferret is directly associated with prairie dog colonies and requires active prairie dog colonies of suitable size and density to maintain viable population levels. No wild black-footed ferret populations are known to occur within the black-footed ferret analysis area in Wyoming. Although the Shirley Basin supports the only known extant population of wild black-footed ferrets in Wyoming, there are numerous white-tailed prairie dog complexes within the black-footed ferret analysis area for both the Rawlins and Rock Springs BLM FOs that constitute suitable habitat for the black-footed ferret. Many of these complexes have not been surveyed for black-footed ferrets. However, on March 6, 2013, the USFWS issued a letter acknowledging “block clearance” for the State of Wyoming in response to a request from the WGFD. This letter provided acknowledgment that the likelihood of identifying wild ferrets in Wyoming, outside of those resulting from reintroductions, is minimal (USFWS 2013h).

In addition to the Shirley Basin reintroduction site in south-central Wyoming, there is only one other reintroduction site within the black-footed ferret analysis area: the Northwestern Colorado/Northeastern Utah Black-footed Ferret Experimental Population Area (EXPA). Portions of the proposed Project alignment are located within a USFWS designated EXPA (USFWS 1998). This area encompasses portions of Sweetwater County, Wyoming and Rio Blanco County, Colorado; all of Moffat County, Colorado; and Uintah County, Utah.

An EXP/NE designation allows the USFWS considerable flexibility in managing reintroduced populations of endangered species. The ESA allows for treating an EXP/NE as a “proposed species” under the Act (USFWS 1998). However, according to the ESA Consultation Handbook (USFWS and NMFS 1998), “*a “non-essential experimental population” (EXP/NE) is not essential to the continued existence of the species*.” Areas designated as EXP/NE areas do not require black-footed ferret surveys, although the USFWS encourages project applicants to protect all white-tailed prairie dog towns for their value to the

K:\Projects_4\TransWestExpress\12907_003_Transwest_Express\Figures\DocumentFigures\2015_BA_v2\SSWildlife\Fig_6_19_BFF.mxd





- Action Area
- Analysis Area
- Black-footed Ferret Potential Habitat
- 10(j) Experimental/Non-Essential Range
- Ferret Management Area

Action Area Buffer for Analysis Area: 0.5 Mile

TRANSWEST EXPRESS TRANSMISSION PROJECT

Figure 6-19
Area of Analysis for
Black-footed Ferret

0 5 10 20 Miles
0 5 10 20 km
1:1,250,000

N

Western AREA POWER ADMINISTRATION

Exported On: 3/31/2015

prairie ecosystem and the myriad of species that rely on them. The EXPA encompasses portions of Rio Blanco and Moffat counties in Colorado, Sweetwater County, Wyoming, and Uintah and Duchesne counties, Utah. The EXPA has been separated into the Northwestern Colorado Experimental Population Sub-Area and the Northeastern Utah Experimental Population Sub-Area. Within the Northwestern Colorado Sub-Area, the Little Snake Black-footed Ferret Management Area was established as a specific reintroduction site. The Little Snake area is located in northwestern Moffat County, Colorado, along the Colorado-Wyoming border. However, no ferrets have ever been released in the Little Snake Management Area. Within the Northeastern Utah Sub-Area, the Coyote Basin Black-footed Ferret Management Area was established as a specific reintroduction site. The Coyote Basin area is located in Uintah County, Utah, along the Utah-Colorado state border.

A total of 255 black-footed ferrets have been released into the Coyote Basin Area since 1999. Reproduction was confirmed in Coyote Basin in 2000, and the population is currently estimated at 25 individuals (USFWS 2008c). Limited areas of suitable black-footed ferret habitat that are located within the refined transmission corridor east of the Green River may support individuals or offspring remaining from the 2000 Coyote Basin reintroduction. Impacts to black-footed ferrets in this area are anticipated to be avoided and minimized by TransWest's ability to span areas of suitable habitat.

Ferret releases at the Wolf Creek site northeast of Rangely, Colorado, were initiated in 2001, and to date a total of 217 individuals have been released at this location. The Wolf Creek population is currently estimated at 0 individuals. Plague has impacted the Wolf Creek population of white-tailed prairie dogs and black-footed ferrets in recent years and no black-footed ferrets have been documented during surveys in 2009, 2010, or 2011. Prior to the population crash, the highest population estimate was 16 individuals. The USFWS classifies both re-introduced populations as "marginal" (USFWS 2008c). The only non-EXP/NE areas found within the black-footed ferret analysis area are located in Grand, Emery, or Carbon counties, Utah, and portions of Sweetwater and Carbon counties, Wyoming. The black-footed ferret analysis area includes the EXPA in Utah and Colorado, and the Continental Divide (2), Dad, and Desolation Flats non-block cleared areas in Wyoming.

The nearest re-introduced population of black-footed ferrets in Wyoming is approximately 65 miles northeast of the Northern Terminal siting area in the Shirley Basin, Wyoming. Due to the distance from the Northern Terminal siting area to the nearest known black-footed ferret population there is an extremely low likelihood of black-footed ferrets occurring at the Northern Terminal siting area. Consequently, no impacts to black-footed ferrets are anticipated from construction and operation of the Northern Terminal.

Conservation Measures

Impacts to the black-footed ferret would be minimized through implementation of the following design features as described in Chapter 3.0:

- Applicant-committed conservation measures and design features: TWE-31, TWE-33, and TWE-34.
- General conservation measure **WLF-10**.

Implementation of the following species-specific conservation measure would avoid or reduce effects of the proposed Project on the black-footed ferret.

SSWS-9: Prior to final engineering design, TransWest would conduct a habitat assessment and, if necessary, species-specific surveys for black-footed ferrets using a USFWS-approved survey protocol. Survey results would be used to avoid siting project infrastructure (e.g., towers and access roads) within suitable black-footed ferret habitat (i.e., active white-tailed prairie dog colonies that are greater than 200 acres in area) the black-footed ferret analysis area.

To limit potential project-related increases in raptor predation on black-footed ferrets and associated prey populations, TransWest would be required, subject to consultation with the BLM, USFWS, Western, and applicable state wildlife agencies, to use alternative structure types (e.g., tubular monopoles) with perch discouragers on segments of the proposed Project located within the black-footed ferret analysis area.

Effectiveness: Conducting a habitat assessment and black-footed ferret surveys (if suitable habitat is found along the proposed ROW) and avoiding impacts to suitable/occupied habitat would be highly effective in preventing Project-related impacts to the black-footed ferret.

Although no direct evidence of the effects of structure type upon predator abundance or predation rates of black-footed ferrets has been identified in the current scientific literature, the BLM and Western have identified this type of mitigation as having the potential to reduce the impacts of predation upon black-footed ferrets. This conservation measure is intended to minimize the potential for increased predation on black-footed ferret by limiting raptor perching locations on transmission towers. Black-footed ferrets also may benefit from alternative structure types and perch deterrents through reduction of predation on white-tailed prairie dogs, the main prey species of the Black-footed ferret. While transmission lines fitted with anti-perching devices do not necessarily eliminate perching entirely (APLIC 2006; Lammers and Collopy 2007), they are designed to discourage use of the transmission line as a hunting perch which could in turn decrease the potential for predation by raptors on black-footed ferrets.

Direct and Indirect Effects

Potential impacts to potentially suitable black-footed ferret habitat would include the construction and operation disturbance of approximately 432 acres (1.8 percent) and 83 acres (0.3 percent), respectively, of known white-tailed prairie dog colonies within the analysis area. These acreages present a conservative estimate of impacts as they do not account for implementation of the conservation measures described above. In reality, direct impacts to black-footed ferrets as a result of project implementation are expected to be minimal as surface disturbance to active white-tailed prairie dog colonies would be avoided through implementation of conservation measure **SSWS-9**.

Indirect impacts that could occur as a result of increased human activity and public access and associated increases in domestic dogs and raccoons, which have potential to expose ferrets to canine distemper and sylvatic plague, would be avoided or minimized through the implementation of general conservation measure **WLF-10**.

It should be noted that certain surface-disturbing activities (e.g., blading/grading vegetation for pads, roads, ancillary facilities) could actually improve white-tailed prairie dog habitat and therefore possibly benefit black-footed ferrets. Decreasing vegetation cover creates open areas suitable for white-tailed prairie dog colonization, while subsequent re-vegetation increases forage for white-tailed prairie dogs. As prairie dogs increase the colony size, black-footed ferret potential habitat is increased.

Cumulative Effects

No reasonably foreseeable non-federal actions have been identified within the vicinity of the proposed Project action area for the black-footed ferret.

Monitoring

There are currently no known short- or long-term monitoring and reporting plans for black-footed ferret in the Project analysis area.

Determination

Effect on the Species: The Proposed Action *may affect but is not likely to jeopardize* the black-footed ferret as a result of the proposed Project construction and operation.

Effect on Critical Habitat: Critical habitat has not been designated for the black-footed ferret; thus the Proposed Action would have *no effect* on critical habitat for this species.

*Rationale: Implementation of conservation measures **WLF-10** and **SSWS-9** would result in the avoidance of adverse impacts to black-footed ferrets within the action area. To the extent that surface disturbance and interim reclamation activities enhance habitat for white-tailed prairie dogs, black-footed ferret habitat would benefit as well.*

6.3 Candidate Species

6.3.1 Birds

6.3.1.1 Greater Sage-grouse (Candidate)

Environmental Baseline

Conservation Status

On February 26, 2008, the USFWS initiated a status review to determine whether the greater sage-grouse warranted protection under the ESA (73 FR 10218). On March 5, 2010, the USFWS determined that the greater sage-grouse warrants protection under the ESA; however, listing was precluded by the need to take action on the other species facing more immediate and severe extinction threats. The USFWS concluded that the greater sage-grouse would be added to the candidate species list. Therefore, greater sage-grouse in Wyoming, Colorado, and Utah continue to be managed by WGFD, CPW, and UDWR, respectively. They receive no statutory protection under the ESA and because the greater sage-grouse is currently a candidate species for listing under the ESA; no critical habitat has been designated at this time.

Prior to the 19th Century, sage-grouse inhabited 13 western states and 3 Canadian provinces, and their potential habitat covered over 460,000 square miles (Schroeder et al. 2004). Sage-grouse have declined across their range due to a variety of causes and now occupy approximately 257,000 square miles, or 56 percent of their historic range (Schroeder et al. 2004). They currently occur in 11 states and 2 Canadian provinces (Knick and Connelly 2011).

Estimates of greater sage-grouse abundance were mostly anecdotal prior to the implementation of systematic surveys in the 1950s. Early reports suggested the birds were abundant throughout their range, with estimates of historical populations ranging from 1,600,000 to 16,000,000 birds (65 FR 51580). In 2000, the USFWS estimated the range wide abundance of sage-grouse to be between a minimum of 100,000 (taken from Braun 1998) up to 500,000 birds (65 FR 51578).

Neither historic nor current numbers of sage-grouse are accurately known, thus the actual rate and scale of the decline is uncertain. However, three groups of researchers using different statistical methods (but the same lek count data) concluded that range-wide greater sage-grouse have experienced long-term population declines in the past 43 years, with that decline lessening in the past 22 years (USFWS 2010). Generally, the proportion of small leks has increased between 1965 and 2003 for most states and provinces while the proportion of large leks has decreased (Connelly et al. 2004).

Life History and Habitat Association

Greater sage-grouse distribution is highly correlated with the distribution of sagebrush (*Artemisia* spp.), and in particular, big sagebrush (*Artemisia tridentata*) (Schroeder et al. 2004). This species requires large, interconnected expanses of sagebrush with healthy, native understories. Greater sage-grouse are considered a sagebrush ecosystem obligate species. Obligate species are those species that are restricted to certain habitats or to limited conditions during one or more seasons of the year to fulfill their life requirements. Sagebrush species provide nesting, brooding, and fall and winter cover, as well as forage throughout the year (CGSGC 2008).

Sage-grouse exhibit strong site fidelity (loyalty to a particular area) to seasonal habitats (i.e., breeding, nesting, brood rearing, and wintering areas) (Connelly et al. 2011, 2004). Adult sage-grouse rarely switch from these habitats once they have been selected, limiting their ability to respond to changes in their local environments (Schroeder et al. 1999).

Lekking/Breeding/Nesting Habitat:

The center of breeding activity for the greater sage-grouse is referred to as a strutting ground or lek. Leks are characterized as flat, sparsely vegetated areas within large tracts of sagebrush, where a few to 100 or more male sage-grouse will perform a breeding behavior known as strutting (Connelly et al. 2004; Crawford et al. 2004). Males begin to appear on leks in March, with peak attendance of Utah leks occurring in late-March and peak attendance in Colorado and Wyoming leks occurring in April (CGSSC 2008; UDWR 2009a; WGFD 2003). Habitat during the 5-week period preceding egg-laying centers on low sagebrush, black sagebrush, and Wyoming big sagebrush communities. During this period, 50 to 90 percent of the hen's diet is sagebrush with the remainder being mostly forbs (Crawford et al. 2004). Nesting generally commences 1 to 2 weeks after mating and may continue as late as early June (UDWR 2009a). Greater sage-grouse nesting habitat typically is centered on active leks and consists of medium to tall sagebrush with a perennial grass understory (Connelly et al. 2000). Nests are usually located near leks, but hens may move long distances from leks to nests (Crawford et al. 2004). Wakkinen et al. (1992) noted that 55 percent of nests, in Idaho, were within 3 km of the lek were copulation occurred. Studies have shown that taller sagebrush with larger canopies and more residual understory cover usually lead to higher nesting success for this species (Connelly et al. 2004, 2000).

Brood-Rearing Habitat:

During late spring and summer, hens and broods are typically found in more lush habitats consisting of a high diversity of grasses and forbs that attract an important component of sage-grouse chick diet: insects. Forbs and insects comprise the bulk of sage-grouse chick diets until they are approximately 12 weeks old, at which time sagebrush becomes a common component. Sage-grouse chicks forage on diverse taxa including invertebrates, forbs, shrubs, and grass (Crawford et al. 2004).

Important brood-rearing habitats include wet meadows, riparian areas, and irrigated farmland within or near sagebrush. Hens with broods utilize these habitats until forbs desiccate and insect abundance decreases. Habitat use during the brood-rearing period is related to changes in food availability and hens with broods are typically found where forb abundance is greatest (Crawford et al. 2004). Unsuccessful hens and cocks also will utilize these same habitats; however, due to their nutritional flexibility, they are able to occupy a wider variety of habitats during the spring and summer months (Connelly et al. 2004). In many greater sage-grouse populations, limited availability of high quality brood-rearing habitat often negatively impacts recruitment. Factors affecting the availability of brood-rearing habitat include drought, non-native grass and weed invasions, overgrazing associated with historic improper range management strategies (Klebenow 1985, 1982; Oakleaf 1971), and sagebrush removal.

Wintering Habitat:

During winter, sage-grouse utilize medium to tall sagebrush communities and primarily feed on sagebrush leaves (Crawford et al. 2004). Depending on the severity of the winter, greater sage-grouse move to south- and west-facing slopes that maintain exposed sagebrush. Studies have shown that south-facing slopes with sagebrush at least 10 to 12 inches above the snow level are required for both food and cover. Windswept ridges, draws, and swales also may be used, especially if these areas are in close proximity to exposed sagebrush (Connelly et al. 2004). In years with severe winter conditions (i.e., deep snow), greater sage-grouse often gather in large flocks in areas with the highest quality winter habitat. Home range for winter migratory and non-migratory populations has been reported as >140 square km and 11 to 31 km (Crawford et al. 2004). It is suggested that high quality winter habitat is

limited in portions of the greater sage-grouse's range (Connelly et al. 2000). Wintering habitat for greater sage-grouse has been defined for populations in Colorado and Utah, and is currently being defined for populations in Wyoming (WGFD 2012).

The greater sage-grouse is currently a candidate species for listing under the ESA, and no critical habitat has been designated at this time.

Threats

The loss and fragmentation of sagebrush habitats is a primary cause of the decline of sage-grouse populations. Habitat fragmentation, largely a result of human activities, can result in reductions in lek persistence, lek attendance, population recruitment, yearling and adult annual survival, female nest site selection, nest initiation, and complete loss of leks and winter habitat (USFWS 2013m). Other factors associated with habitat loss and fragmentation are summarized by Knick and Connelly (2011) and include conversion of sagebrush habitats for agriculture, the expanding human populations in the western U.S. and the resulting urban development in sagebrush habitats, vegetation treatments resulting in the alteration or removal of sagebrush to enhance grazing for livestock, and impacts from wild ungulates and free-roaming horses and burros.

An expert panel convened by the USFWS for evaluation of listing factors identified the threats they considered as having the most influence on greater sage-grouse populations across its range and then ranked their relative importance of each threat to greater sage-grouse (70 FR 24870). The threats considered to have the greatest impact to greater sage-grouse range-wide included, in order: invasive species, infrastructure as related to energy development and urbanization, wildfire, agriculture, grazing, energy development, urbanization, strip/coal mining, weather, and pinyon-juniper woodland expansion.

The lack of sufficient regulatory mechanism aimed at conserving sage-grouse and their habitats was identified as a primary threat leading to the USFWS's warranted but precluded finding in 2010 (75 FR 13910). However, many state and local governments across the range of the greater sage-grouse are working to develop adequate mechanisms to address this particular threat.

Recovery

As a candidate species, greater sage-grouse receive no statutory protection under the ESA nor is there a USFWS Recovery Plan. Greater sage-grouse are currently managed by state wildlife agencies. Wyoming, Utah, Colorado, and Nevada have developed Greater Sage-grouse Management/ Conservation Plans that outline goals and objectives for managing the species (Colorado Greater Sage-Grouse Steering Committee [CGSSC] 2008; South Central Sage-grouse Working Group 2007; Southwest Wyoming Local Sage-grouse Working Group 2007; UDWR 2009a). While the approach and objectives of each Management/Conservation Plan can vary, all are aimed at increasing the numbers of sage-grouse, conserving sagebrush habitat, and precluding the need for listing under the ESA.

In an effort to prevent federal listing of the greater sage-grouse, Wyoming, Utah, Colorado, and Nevada have developed Greater Sage-grouse Management/Conservation Plans that outline goals and objectives for managing the species (CGSSC 2008; South Central Sage-grouse Working Group 2007; Southwest Wyoming Local Sage-grouse Working Group 2007; State of Nevada 2012; UDWR 2009a). In addition, the Wyoming BLM and the State of Wyoming have issued several regulations regarding management of the greater sage-grouse in Wyoming. BLM Instruction Memoranda (IM) 2010-012, 2012-043, 2012-044, 2012-019, and State of Wyoming EO 2011-5 include specific protection measures guiding development in greater sage-grouse habitat, specifically in core population areas. The WGFD has developed a map of greater sage-grouse core population areas in Wyoming. Greater sage-grouse core population areas include areas with the highest densities of breeding greater sage-grouse in the state, as well as areas important for connectivity between populations. The core population areas include roughly 25 percent of the state but contain 83.1 percent of the greater sage-grouse population in Wyoming.

BLM IM 2012-043 and BLM WY IM 2012-019 provide direction to field managers to ensure that interim conservation procedures are implemented when FOs authorize or carry out activities on public land while the BLM reviews how to best incorporate long-term conservation measures for greater sage-grouse into applicable Land Use Plans. These interim conservation measures are consistent with the BLM's National Strategy for protecting and managing greater sage-grouse and incorporate the following principles:

1. Protection of un-fragmented habitats;
2. Minimization of habitat loss and fragmentation; and
3. Management of habitats to maintain, enhance, or restore conditions that meet greater sage-grouse life history needs.

BLM IM 2012-043 identifies policies and procedures that are to be applied to on-going and proposed BLM activities within areas identified as PPH and PGH. PPH consists of areas that have been identified as having the highest conservation value for maintaining sustainable greater sage-grouse populations. These areas include breeding, nesting, brood-rearing, and wintering habitats. PGH is identified as all other areas occupied either seasonally or year-round by greater sage-grouse. Among the conservation policies and procedures presented in BLM IM 2012-043, those that apply to the Project direct the BLM to:

1. Provide documentation of reasoning for ROW determinations and to require the ROW holder to implement measures to minimize impacts to greater sage-grouse habitat;
2. In cooperation with respective state wildlife agencies, consider the opportunities for both on-site and off-site conservation measures to avoid or minimize habitat and population level impacts; and
3. In cooperation with respective state wildlife agencies, determine that the proposed ROW would cumulatively maintain or enhance greater sage-grouse habitat.

BLM IM 2012-044 provides the BLM direction to incorporate conservation measures identified in the 2011 report on national greater sage-grouse conservation measures published by the Sage-grouse National Technical Team (NTT 2011). NTT conservation measures relating to ROWs include:

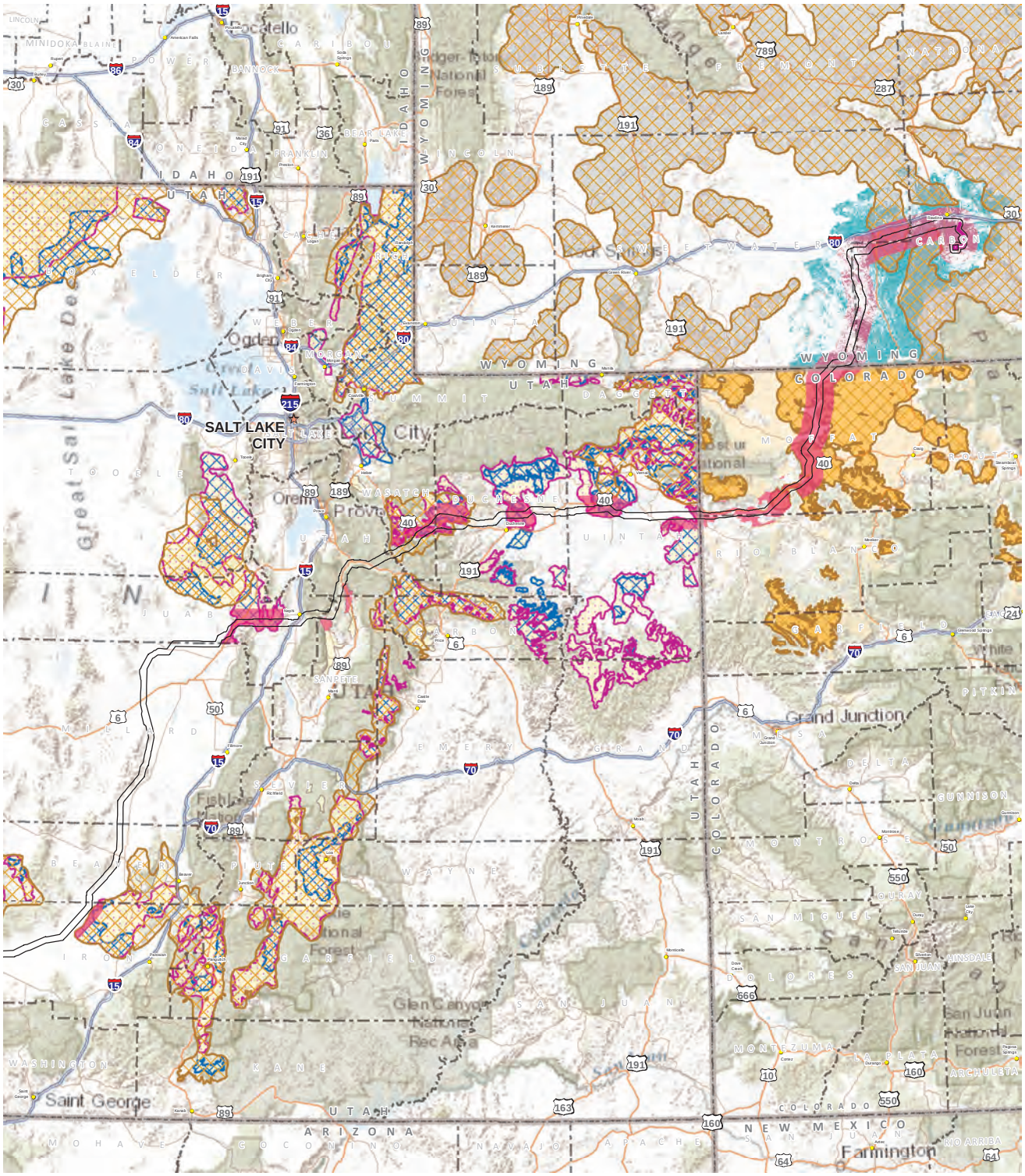
1. Designating priority greater sage-grouse habitat areas as exclusion areas for new ROW permits;
2. Evaluating the feasibility of removing, burying, or modifying existing power lines within priority greater sage-grouse habitat; and
3. Designating greater sage-grouse general habitat areas as avoidance areas for new ROW permits.

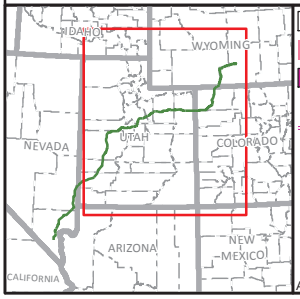
Assessment of Effects

Area of Analysis

The greater sage-grouse analysis area is defined as potential habitat (sagebrush shrubland) within the action area, plus a 4-mile buffer centered on the ROW. The action area is defined in Section 2.2. These areas represent 440,498 acres of potential greater sage-grouse habitat and are depicted in **Figure 6-20**. This total includes 105,448 acres in Wyoming, 108,551 acres in Colorado, 209,888 acres in Utah, and 16,611 acres in Nevada.

K:\Projects_4\TransWestExpress\12907_003_Transwest_Express\Figures\DocumentFigures\2015_BA_v2\SSWildlifeFig_6_20_GreaterSageGrouse.mxd





- Action Area
- Analysis Area
- Ground Electrode Siting Area
- Ground Electrode Overhead Electrical Line
- USFWS Greater Sage-grouse Priority Area for Conservation (PAC)
- Core Area (WY)
- Potential Habitat (WY)
- Occupied Habitat (UT)
- Brooding Habitat (UT)
- Winter Concentration (UT)
- Preliminary Priority Habitat (CO)
- Preliminary General Habitat (CO)

Action Area Buffer for Analysis Area: 4 Miles

TRANSWEST EXPRESS TRANSMISSION PROJECT

Figure 6-20
Area of Analysis for
Greater Sage-Grouse

0 20 40 80 Miles
0 20 40 80 km
1:3,500,000

N

Western AREA POWER ADMINISTRATION

Exported On: 4/2/2015

Wyoming

Greater sage-grouse populations and habitats within the refined transmission corridor in Wyoming are located entirely within the South Central Wyoming Conservation Area (SCCA) as designated by the local greater sage-grouse local working group (South Central Sage-Grouse Working Group [SCSGWG] 2007). The majority of greater sage-grouse within the SCCA are primarily found within the sagebrush grassland habitats, with some birds occupying areas of mountain mixed shrub and salt desert shrub habitats. Lek survey data from 1986 to 2004 indicate that the SCCA population remained steady until 2004. In 2005 and 2006 lek survey data indicated that local populations were increasing to the highest level observed since 1986 (SCSGWG 2007). This population is considered stable to increasing and important threats include energy and infrastructure development, grazing, and recreational activities (USFWS 2013m). The refined transmission corridor would cross the Greater South Pass Core Population Area within the designated existing transmission infrastructure corridor that exists parallel to Interstate 80. The Greater South Pass Core Population Area also is designated by the USFWS as part of the Wyoming Basin Priority Area for Conservation (PAC) (USFWS 2013m). The Wyoming Basin PAC is considered by the USFWS to be at low risk due to its large population size, the availability of large areas of contiguous habitats, and regulatory measures ensuring habitat protection.

Greater sage-grouse habitat within the refined transmission corridor in Colorado consists of a relatively small appendage to the southern edge of the overall species' range in the intermountain west. In Colorado, greater sage-grouse historically occurred in at least 13 counties (Braun 1995). Currently, greater sage-grouse are found in nine Colorado counties and six populations of greater sage-grouse are currently recognized including; Northwest Colorado, North Park, Middle Park, Parachute-Piceance-Roan, Eagle-South Routt, and Meeker/White River. Of these populations, only the Northwest Colorado population would be impacted by the proposed Project corridor.

Colorado

The Northwest Colorado population represents Colorado's largest greater sage-grouse population and is considered to have a low risk of extirpation due to existing areas of connectivity habitat that link to the Wyoming Basin PAC (USFWS 2013m). Lek count data indicates that the long-term population trend is stable despite substantial fluctuations over time. Current threats to the Northwest Colorado population include: conversion of habitat to agriculture, wildfire, noxious weed invasion, energy and mining infrastructure development, grazing, and recreational activities (USFWS 2013m). The BLM/USFS identify 21 separate Management Zones (MZs) within the Colorado (BLM 2013x); of these, proposed Project alternatives would cross occupied greater sage-grouse habitat within the following MZs: 3, 4, 5, 6, 8, 9, and 10.

Utah

In Utah, greater sage-grouse are thought to have been historically distributed in all 29 counties, based on sagebrush distribution, but are now found in 26 counties (UDWR 2009a). They are estimated to occupy only 41 percent of their historic habitats in Utah and are half as abundant as they were prior to 1850 (Beck and Mitchell 1997). Currently, the largest populations of greater sage-grouse in Utah are found in western Box Elder County, in Uintah County on Blue and Diamond mountains, in Rich County, and in central Utah on Parker Mountain, which contains portions of Sevier, Piute, Wayne, and Garfield counties (Final EIS Figure 3.8-3). Smaller populations are found scattered in the central and southern parts of the state (Final EIS Figure 3.8-5). Populations in the early 1970s were approximately twice the size of current populations. Populations reached a low in the mid-1990s and have since increased, but not to previous levels. UDWR, other agencies, and university researchers have identified 11,864 square miles of current greater sage-grouse habitat in Utah, 11,594 square miles of which is considered brood-rearing habitat and 7,323 square miles of which is crucial winter habitat (UDWR 2009a). Presently, the Rich, Strawberry, Emery, and Sheeprocks population area trends are considered to be increasing. The Panguitch, Bald Hills, and Hamlin Valley population area trends are considered to be stable to

increasing. The Uintah, Parker, Box Elder, and Carbon population area trends are considered to be stable. The proposed Project refined transmission corridor would cross occupied greater sage-grouse habitat for the following populations: Deadman's Bench, Halfway Hollow, South Slope Uinta, Strawberry/Fruitland, and Sheeprocks.

Deadman's Bench

The Deadman's Bench population area has 2 leks that have had less than 10 birds observed annually since 1989. While the last 10 years of lek counts estimate a population ranging between 0 and 28 birds (0 to 7 males), the low number of birds suggest this population is connected to other populations because such a low population cannot persist for over 20 years at this level. This area occurs in eastern Utah in Uintah County, south of the Blue Mountain area and is part of Western Association of Fish and Wildlife Agencies (WAFWA) MZ II (Wyoming Basin) (Stiver et al. 2006). This area has a history of anthropogenic disturbances, including oil development and associated infrastructure. While Wyoming big sagebrush is present, the degraded understory does not provide good nesting and brood-rearing habitat but does provide adequate winter habitat. It is difficult to evaluate a population trend for this local population since it extends into Colorado and the lek counts fluctuate to a degree that suggest bird movements extend outside the area. Deadman's Bench is a dry, low-elevation area with even-aged Wyoming big sagebrush and low understory vegetation cover but diverse forbs. Nonnative weeds are common; in particular, cheatgrass is abundant and is a management concern. The COT Report does not include this area in its assessment.

Halfway Hollow

The Halfway Hollow area supports a small-to-medium-sized greater sage-grouse (GRSG) population in a moderately sized and impacted landscape. The population has been directly and indirectly impacted by various anthropogenic disturbances but is somewhat contiguous with other medium to large populations in the region. This population is relatively more resilient to threats due to its proximity and potential connectivity with the adjacent populations. The COT Report (USFWS 2013m) considers these populations "low risk." Based on the last 10 years of lek counts (2003 to 2012), the Halfway Hollow population is estimated to range between 120 and 332 birds (30 to 83 males counted on 10 leks). This population occurs west of Vernal in northeastern Utah and is part of the WAFWA MZ II (Wyoming Basin) (Stiver et al. 2006). The population area is characterized by relatively contiguous habitat in the northern portion, with on-going energy and human-related fragmentation in the southern portion. While anthropogenic habitat disturbances in this area have increased at a relatively slow rate, future interest in the area is growing. The western half of the area is dominated with and fragmented by agricultural fields and rural human developments. Primarily in the southern half of the area are roads, power lines, oil development (290 wells), and proposed oil sands development. The area is characterized by Wyoming sagebrush in the low elevations and mountain sagebrush in the upper elevations. Pinyon-juniper woodland encroachment is particularly problematic in the mid-section of the area. The area has contiguous habitat that ranges in condition from degraded understory vegetation with some cheatgrass at lower elevations, increasing understory diversity at mid-elevations, and intact, diverse understory vegetation at the upper elevations.

South Slope Uinta

The South Slope Uinta population is a small-to-medium-sized GRSG population in a moderately sized area with anthropogenic and natural fragmentation. The population is not well understood, but it appears that the lower two-thirds of the population area has been directly and indirectly impacted by various natural and anthropogenic disturbances and birds are congregating on less-disturbed, high-elevation tribal lands. This population is not included in the COT Report (USFWS 2013a). Based on 6 years of lek counts (2003 to 2012), the South Slope Uinta population is estimated to range between 56 and 340 birds (14 to 85 males counted on 13 leks). This population area occurs in the northeastern portion of Utah in Duchesne County and is part of the Northeast Interior Utah population of WAFWA MZ III

(Stiver et al. 2006). This southern half of the population area (primary private lands) is fragmented and degraded habitat from anthropogenic activities (Ellis 1985). The majority of the birds are found in the northern half of the area, on upper elevation tribal lands where little is known about the habitat use but oil development and pinyon-juniper woodland encroachment are present.

Strawberry/Fruitland

Based on the last 10 years of lek counts (2003 to 2012), the Strawberry Population Area is estimated to range between 135 and 630 birds (34 to 158 males counted on 6 leks). This population area occurs in central Utah in Wasatch and Duchesne counties, and is in the WAFWA Southern Great Basin MZ III (Stiver et al. 2006). The population area encompasses 180,000 acres in Strawberry Valley down to the Fruitland area and ranges in elevation between 6,500 and 10,000 feet. The population area has a history of human-related impacts decreasing the habitat quantity and quality and altering the native wildlife populations. In 1970, when regular lek counts began, the population was estimated to be 600 birds, and by 1999 the estimates were 150 to 200 birds. From 1939 to 1999, the population is estimated to have decreased 95 percent (Bunnell 2000). The decline has been primarily attributed to reservoir expansion, cultivation, sagebrush removal, road and cabin construction, human-associated facilities, and resulting high native and non-native predation.

Sheeprocks

From lek counts conducted the last 10 years (2003 to 2012) on both North (7 leks) and South Sheeprocks (3 leks; also known as the Tintic area) GRSG populations, the estimated population ranges between 200 and 760 birds (50 to 190 males). This population area is on the eastern edge of Tooele and Juab counties and falls within WAFWA MZ III (Stiver et al. 2006). The Sheeprocks (North and South) population area (835,000 acres) is a relatively isolated population and may encompass two lek complexes that have distinct home ranges (Robinson 2007). This population's primary threats are cheatgrass invasion and associated fire intervals that threaten wintering habitat, pinyon-juniper woodland encroachment, localized recreational impacts, predation, and localized wild horse impacts. The Sheeprocks Population Area is a small, isolated area with natural as well as anthropogenic fragmentation. Upper elevation habitats are small but currently intact and lower-elevation wintering habitats are small and degraded areas that are susceptible to fire. The primary threats to this population are fire in wintering habitat, corvid predation, pinyon-juniper woodland encroachment, and localized recreational impacts. The COT Report (USFWS 2013m) considers the northern portion of this population "at-risk," but does not include the southern portion.

Nevada

In Nevada, the proposed Project route crosses the southern boundary of the Lincoln Sage Grouse Population Management Unit but does not cross any occupied greater sage-grouse habitat. The nearest occupied habitat in this PMU is located approximately 15 miles to the north of the transmission line ROW.

Conservation Measures

Project-related impacts to the greater sage-grouse would be minimized through implementation of the following design features and conservation measures as described in Chapter 3.0:

- Applicant-committed conservation measures and design features: TWE-26, TWE-31, TWE-32, TWE-33, and TWE-34.
- Conservation measures: **WLF-1**, **WLF-4**, **WLF-5**, **WLF-6**, **WLF-7**, **WLF-8**, and **SSWS-15**.

In addition, the following species-specific conservation measures would be implemented to avoid or minimize effects of the Proposed Action on the greater sage-grouse:

SSWS–5 – To avoid or minimize Project-related impacts to greater sage-grouse and its habitat, the BLM and Western have coordinated with applicable federal and state land and wildlife management agencies and other stakeholders to develop a suite of mitigation measures for this species. In addition, TransWest has developed a Habitat Equivalency Analysis (HEA) to quantitatively determine an appropriate level of compensatory mitigation that would be implemented to offset unavoidable impacts to sage-grouse habitat. Applicant-committed measures proposed as part of the HEA process are further discussed in Section 3.8.6.3. The BLM and Western support the implementation of the applicant's HEA process and compensatory mitigation measures in conjunction with the following impact avoidance and minimization measures developed through the NEPA process.

General Measures: *To reduce impacts to greater sage-grouse from construction and operation of the proposed Project, TransWest, in consultation with the BLM, Western, and applicable federal and state land and wildlife management agencies, would be required to implement the following general design features:*

1. Placement of Project structures and access roads would maximize use of topographic features to visually screen Project facilities from high quality greater sage-grouse habitat (i.e., Wyoming – within sage-grouse core habitat and within 4 miles of active leks; Colorado – within preliminary priority habitat; Utah – within occupied habitat and within 4 miles of active leks.

   Effectiveness: Visual screening of Project facilities from lekking and nesting greater sage-grouse would reduce both direct and indirect impacts resulting from construction and operation activities.

2. To minimize fragmentation of suitable sage-grouse breeding, brood-rearing, and wintering habitats, the approved transmission line ROW would use existing roads, create no new permanent roads, be accessed via drive and crush wherever possible, and be micro-sited in coordination with applicable state and federal wildlife management.

   Effectiveness: Limiting the construction of new access roads and clearing of existing native vegetation would reduce both direct and indirect impacts from construction and operation by avoiding removal and degradation of otherwise suitable habitat.

3. To limit corvid predation on greater sage-grouse, TransWest would develop a Raven Management Plan that outlines active adaptive management strategies for controlling raven predation and nesting within the Project ROW and includes post–construction monitoring for ravens and removal of raven nests.

   Effectiveness: Development and implementation of a Raven Management Plan is anticipated to reduce predation pressure on greater sage-grouse eggs and chicks through direct removal of raven nests within the ROW and control of raven abundance within the ROW.

4. To limit disturbance to lekking and nesting activity, disruptive construction and maintenance activities within 4 miles of occupied/active leks would be prohibited between March 1 and June 30. Activities determined to be non-disruptive by the BLM, Western, and applicable federal and state land and wildlife management agencies would be permitted between March 1 and June 30.

   Effectiveness: Recent studies have observed impacts of increased noise levels on male greater sage-grouse activity at lekking sites during the breeding season (Blickley et al. 2012). The impacts of increased anthropogenic noise levels on nesting greater sage-grouse have not been determined through direct investigation. Although information on greater sage-grouse communication is lacking in the scientific literature, the species may be particularly vulnerable to noise impacts during the breeding season because their low-frequency vocalizations can be masked by most sources of anthropogenic noise (Blickely et al. 2012). Seasonal restrictions of disruptive construction and maintenance activities is anticipated to be effective in reducing adverse noise impacts to breeding and nesting greater sage-grouse within the Project area.

5. To limit the potential for adverse impacts resulting from contact with construction equipment, vehicles, and personnel, TransWest would implement a vehicle speed limit of 15 mph on roads without posted speed limits in areas of occupied sage-grouse habitat.

   *Effectiveness***:** Reductions in vehicle speed have been shown to be effective in reducing wildlife mortality within active construction areas and during maintenance activities (Danks & Porter 2010; Meisingset 2014; Neumann et al. 2012; Seiler 2005).

6. Under Applicant Committed Design Feature TWE-26, TransWest has committed to developing a Noxious Weed Management Plan in accordance with existing BLM Pesticide Use Plan requirements. Control of noxious weeds would minimize the potential for weed-related degradation of occupied sage-grouse habitat. Prior to the use of chemical weed control agents, herbicide applications would be reviewed by agency wildlife biologists to ensure consistency with state and local greater sage-grouse conservation goals.

   *Effectiveness***:** Development and implementation of a Noxious Weed Management Plan is anticipated to reduce adverse impacts to greater sage-grouse habitat suitability by reducing the frequency of noxious weed invasions within the Project area. Conformance with BLM Pesticide Use Plan requirements would ensure that chemical weed treatments do not harm greater sage-grouse individuals or native habitats.

Site-specific Measures*:* In addition to requiring implementation of the general mitigation measures discussed above, the BLM and Western would consider requiring additional impact avoidance and minimization measures on a site-specific basis in areas of greater sage-grouse habitat located within areas that meet all of the following state-specific criteria:

- Areas within 4 miles of active leks and within Wyoming Core Areas designated under EO 2011-05;
- Areas within 4 miles of active leks and within areas of PPH in Colorado; and
- Areas within 4 miles of active leks and within areas of designated brood-rearing habitats and winter concentration areas in Utah.

Identification of additional greater sage-grouse mitigation measures to be implemented in local areas would be completed prior to finalization of the POD in coordination with the Applicant, BLM, Western, and local interdisciplinary teams comprised of applicable federal and state land and wildlife management agency staff. Criteria for determining site-specific measures could include, but would not be limited to: existing vegetation communities, existing fragmentation, proximity to active leks, visibility of the proposed transmission line and towers from active lek locations, presence of noxious and invasive weed species, topography, proximity to USFWS PACs, proximity to designated winter concentration areas, proximity to nesting habitat, proximity to brood rearing habitat, proximity to available water sources, proximity to other anthropogenic sources of disturbance, and co-location with existing transmission infrastructure.

Additional measures identified by the BLM and Western for consideration on a site-specific basis in coordination with appropriate federal and state agencies would include:

1. Installation of alternative structure types consisting of self-supporting tubular steel monopole structures to reduce the potential for perching and nest construction by avian predators of greater sage-grouse.

   *Effectiveness***:** Although no direct evidence of the effects of structure type upon predator abundance or predation rates of greater sage-grouse has been identified in the current scientific literature, the BLM and Western have identified this type of mitigation as having the potential to reduce the impacts of predation upon greater sage-grouse populations. Following construction, specific locations identified as requiring this mitigation would be monitored to identify the

effectiveness of self-supporting monopoles in reducing predation pressure on greater sage-grouse from increased raven and raptor abundance along the transmission line corridor.

Installation of self-supporting tubular monopole structures are anticipated to result in additional impacts to greater sage-grouse during construction and operation as these structures require a larger area to install structure foundations, increased vehicle traffic to deliver foundation materials to each tower location, increased vehicle traffic to remove excavated spoils from foundation installations, and approximately 20 to 30 percent more transmission towers per mile of transmission line due to reduced span lengths.

2. Installation of perch deterrents on transmission structures to reduce the potential for perching by avian predators of greater sage-grouse.

   Effectiveness: Perch deterrents were initially designed to reduce electrocution risks by discouraging birds from perching on smaller distribution power poles and transmission towers in locations were the separation distance between charged and grounded components was less than the average wingspan of common bird species. They were not intended to remove all perching opportunities along a transmission line (APLIC 2006). Research into the use of perch deterrents has shown that the effectiveness of specific deterrents is limited and can vary by deterrent type and transmission structure configuration. Lammers and Collopy (2007) concluded that the use of perch deterrents were ineffective in completely eliminating perching by avian predators within occupied greater sage-grouse habitat in Nevada, but they were shown to result in reduced perching duration by predators upon transmission structures. In some cases, deterrents also may be useful in decreasing avian predation on sensitive prey species by reducing avian use of power lines. Other studies have observed the ability of avian predators to defeat perch deterrents and use the deterrents themselves as substrate for nest materials. To the extent that perch deterrents could result in increased predator nesting success and recruitment, their use would have potential to result in the unintended consequence of increased predation on greater sage-grouse (APLIC 2012, 2006). Although no direct evidence of the effects of perch deterrents upon predator abundance or predation rates of greater sage-grouse has been identified in the current scientific literature, the BLM and Western, in coordination with the USFWS, have identified this type of mitigation as having the potential to reduce the impacts of predation upon greater sage-grouse populations. The effectiveness of perch deterrents/discouragers is based on appropriate design, proper siting and a commitment for long-term maintenance. Following construction, locations in which perch deterrents are installed would be monitored to identify the effectiveness of these measures in reducing raven and raptor predation pressure on greater sage-grouse.

3. In areas determined to be unsuitable for the installation of self-supporting tubular steel monopoles, applicants may be required to install agency-approved guy wire marking devices on all transmission tower guy lines to increase the visibility of each wire and reduce the risk of collision by flying greater sage-grouse.

   Effectiveness: Although research into the use of wire marking devices on guy wires associated with large communication towers has indicated that wire marking can be effective in reducing avian collision mortality (Gehring et al. 2011, 2009), current literature supporting the effectiveness of marking transmission tower guy wires is lacking. Furthermore, APLIC 2012 found that there is no published information suggesting that guyed power line structures pose a significant collision risk for birds. Although no direct evidence of the effects of guy wire marking upon collision rates of greater sage-grouse has been identified in the current scientific literature, the BLM and Western have identified this type of mitigation as having the potential to reduce the impacts of collision with guy wires upon greater sage-grouse populations. Following construction, locations identified as requiring this mitigation would be monitored to identify the effectiveness of guy wire marking in concert with other site-specific conservation measures within the transmission line corridor.

4. Outfit all newly constructed fencing with agency–approved bird diverters/wire markers.

Effectiveness: Research into the effectiveness of fence marking has shown that marking fences within close proximity to active lek locations has been found to reduce collisions by greater sage-grouse by up to 83 percent (Christiansen et al. 2009; Steven et al. 2012).

For site-specific locations where it is determined that alternative structure types, perch deterrents, and guy wire marking are not feasible due to other resource issues or physical constraints, the BLM and Western will consider alternative mitigation approaches proposed by the Applicant, state wildlife agencies, and local stakeholders to ensure adequate avoidance, minimization, or compensation of potential adverse impacts to greater sage-grouse.

Direct and Indirect Effects

Impacts to greater sage-grouse from the construction and operation of the proposed Project can be grouped into two main categories, direct and indirect. Direct impacts include habitat loss, disturbance from construction activities resulting in temporary displacement of individuals, and mortality when greater sage-grouse collide with power lines or their supporting infrastructure, such as guy wires. Indirect impacts could include avoidance as a result of increased predation from perching raptors and human activity during construction and operation.

A summary of impact parameters for greater sage-grouse leks is presented in **Table 6-7,** which shows that a total of 45 occupied/active leks occur within 4 miles of the proposed Project route (i.e., 23 occupied leks in Wyoming and 11 active leks in Colorado, and 11 active leks in Utah). Additional direct and indirect impacts to greater sage-grouse habitat including Wyoming Core Population Areas, Colorado Preliminary Priority Habitat, Colorado Preliminary General Habitat, Utah brood-rearing and nesting habitat, Utah Wintering Habitat, and Utah Occupied Habitat are presented in **Table 6-8**. In total, the Project would result in the construction and operation disturbance of 3,171 acres and 753 acres, respectively, of sagebrush shrubland habitat found along the Project route in Wyoming, Colorado, and Utah as shown in **Table 6-8**. Indirect impacts would occur to 323,256 acres of potential sage-grouse habitat within the greater sage-grouse analysis area (**Table 6-8**). A summary of greater sage–grouse attendance at leks within 4 miles of the alignment is presented in **Table 6-9** and a summary of the number of visible occupied leks within 0.5, 1, 2, and 4 miles of alignments are presented in **Table 6-10**.

Explanation of Visibility Impact Analysis for Occupied Greater Sage–grouse Leks

The numbers of occupied sage-grouse leks visible from the alignments, as presented in **Table 6-10**, were based on line of sight calculations, which accounted for a number of variables. The vertical distance above the alignment by which raptors and corvids could perch on transmission line tower structures was based on the assumption that raptors and corvids would perch an average of 150 vertical feet above ground surface on tower structures as well as an assumed raptor height of 2 feet. Thus, visibility of occupied greater sage-grouse leks was based on line of sight from 152 vertical feet above the alignment.

Visibility calculations also were based on topographical variation within 4 miles of the alignment that would affect visibility of sage-grouse leks from potential perches 152 vertical feet above the alignment. For example, a sage-grouse lek in an area with flat terrain might be visible from 1 mile away, whereas a lek in an area with hilly or mountainous terrain might not be visible from 1 mile away due to an obstruction to line of sight. Due to a lack of data on vegetative structure and height within 4 miles of the alignment, vegetative height was not figured into line–of–sight calculations. Occupied leks visible from within 4 miles of the alignment would potentially be at greater risk of predation by perching raptors. However, implementation of general and site-specific measures listed under **SSWS–5** are anticipated to limit raptor and corvid predation and impacts to sage-grouse visible from the alignment. Thus, impacts associated with these occupied leks are expected to be low magnitude.

Table 6-7 Summary of Impact Parameters for Greater Sage–grouse Leks

Parameter	Region I	Region II	Region III	Analysis Area Total
Wyoming				
Number of occupied leks within 0.5 mile of alignments in Wyoming	1	-	-	1
Number of occupied leks within 1 mile of alignments in Wyoming	3	-	-	3
Number of occupied leks within 2 miles of alignments in Wyoming	8	-	-	8
Number of occupied leks within 3 miles of alignments in Wyoming	17	-	-	17
Number of occupied leks within 4 miles of alignments in Wyoming	23	-	-	23
Colorado				
Number of occupied leks within 0.5 mile of alignments in Colorado	1	-	-	1
Number of occupied leks within 1 mile of alignments in Colorado	5	-	-	5
Number of occupied leks within 2 miles of alignments in Colorado	7	-	-	7
Number of occupied leks within 3 miles of alignments in Colorado	8	-	-	8
Number of occupied leks within 4 miles of alignments in Colorado	11	-	-	11
Utah				
Number of occupied leks within 0.5 mile of alignments in Utah	-	3	-	3
Number of occupied leks within 1 mile of alignments in Utah	-	3	-	3
Number of occupied leks within 2 miles of alignments in Utah	-	6	-	6
Number of occupied leks within 3 miles of alignments in Utah	-	9	-	9
Number of occupied leks within 4 miles of alignments in Utah	-	10	1	11
Total Analysis Area				
Total number of occupied leks within 0.5 mile of alignment	2	3	-	5
Total number of occupied leks within 1 mile of alignment	8	3	-	11
Total number of occupied leks within 2 miles of alignment	15	6	-	21
Total number of occupied leks within 3 miles of alignment	25	9	-	34
Total number of occupied leks within 4 miles of alignment	34	10	1	45
Length of transmission line in miles (habitat fragmentation and collision potential)[1]	158	252	281	691

[1] Length refers to length of 600–kV transmission line and serves as a proxy metric for avian collision potential.

1

Table 6-8 Summary of Proposed Action Impact Parameters for Greater Sage–grouse Habitats

Parameter	Region I			Region II			Region III			Analysis Area Total		
Habitat Disturbance	Construction Impact	Operation Impact	Indirect Impact	Construction Impact	Operation Impact	Indirect Impact	Construction Impact	Operation Impact	Indirect Impact	Construction Impact	Operation Impact	Indirect Impact
Impacts to Wyoming core population areas (acres)	204	34	19,223	-	-	-	-	-	-	204	34	19,223
Impacts to Colorado Preliminary Priority Habitat (acres)	419	108	42,836	-	-	-	-	-	-	419	108	42,836
Impacts to Colorado Priority General Habitat (acres)	457	114	51,237	265	49	29,426	-	-	-	722	163	80,663
Impacts to Utah nesting/brood–rearing habitat (acres)	-	-	-	861	185	101,186	-	-	-	861	185	101,186
Impacts to Utah wintering habitat (acres)	-	-	-	692	154	80,200	-	-	-	692	154	80,200
Impacts to Utah occupied habitat[1]	-	-	-	890	197	105,380	-	-	-	890	197	105,380
Impacts to potential greater sage-grouse habitat[2]	1,218	269	124,553	1,334	348	139,370	655	130	68,892	3,207	747	332,815

[1] Occupied habitat includes brood–rearing habitat and wintering habitat.

[2] Potential greater sage-grouse habitat is based on acres of impacts to sagebrush shrubland vegetation community within the greater sage-grouse analysis area.

Table 6-9 Summary of Greater Sage–grouse Attendance at Leks within 4 miles of the Alignment

Parameter[1]	Region I	Region II	Region III
Wyoming			
Number of active leks	23	-	-
Peak male attendance combined 2004 – 2013[2]	461	-	-
Minimum male attendance combined 2004 – 2013[3]	9	-	-
3–year average lek attendance[1]	6.85	-	-
Average attendance across all leks[4]	10.33	-	-
Total attendance 2004 – 2013[1]	1,736	-	-
Number of leks with no attendance 2009 – 2013[5]	7	-	-
Survey effort[6] (percent)	93.3	-	-
Colorado			
Number of active leks	11	-	-
Peak male attendance combined 2004 – 2013[2]	339	-	-
Minimum male attendance combined 2004 – 2013[3]	28	-	-
3–year average lek attendance[1]	9.60	-	-
Average attendance across all leks[4]	14.69	-	-
Total attendance 2004 – 2013[1]	1,440	-	-
Number of leks with no attendance 2009 – 2013[5]	1	-	-
Survey effort[6] (percent)	98.0	-	-
Utah			
Number of active leks	-	10	-
Peak male attendance combined 2004 – 2013[2]	-	222	-
Minimum male attendance combined 2004 – 2013[3]	-	65	-
3–year average lek attendance[1]	-	9.83	-
Average attendance across all leks[4]	-	13.23	-
Total attendance 2004 – 2013[1]	-	939	-
Number of leks with no attendance 2009 – 2013[5]	-	1	-
Survey effort[6] (percent)	-	88.7	-

[1] Lek count numbers are male birds only, most recent data used.

[2] Sum of the 10–year peak annual counts from all leks within 4 miles combined (2004–2013).

[3] Sum of the 10–year minimum count from all leks within 4 miles combined (2004–2013).

[4] Total males observed/Number of surveys.

[5] Although leks are classified as active or occupied, surveys have not observed male attendance over previous 5 years.

[6] Number of surveys/Number of potential surveys (10 years x 28 leks = 280 potential surveys).

1

Table 6-10 Summary of Greater Sage–grouse Lek Visibility

Parameter	Region I	Region II	Region III
Wyoming			
Number of visible occupied leks within 0.5 mile of alignments	-	-	-
Number of visible occupied leks within 1 mile of alignments	3	-	-
Number of visible occupied leks within 2 miles of alignments	11	-	-
Number of visible occupied leks within 3 miles of alignments	18	-	-
Number of visible occupied leks within 4 miles of alignments	21	-	-
Colorado			
Number of visible occupied leks within 0.5 mile of alignments	-	-	-
Number of visible occupied leks within 1 mile of alignments	6	-	-
Number of visible occupied leks within 2 miles of alignments	12	-	-
Number of visible occupied leks within 3 miles of alignments	13	-	-
Number of visible occupied leks within 4 miles of alignments	16	-	-
Utah			
Number of visible occupied leks within 0.5 mile of alignments	-	1	-
Number of visible occupied leks within 1 mile of alignments	-	1	-
Number of visible occupied leks within 2 miles of alignments	-	4	-
Number of visible occupied leks within 3 miles of alignments	-	8	-
Number of visible occupied leks within 4 miles of alignments	-	9	1
Analysis Area Total			
Number of visible occupied leks within 0.5 mile of alignments	-	1	-
Number of visible occupied leks within 1 mile of alignments	9	1	-
Number of visible occupied leks within 2 miles of alignments	23	4	-
Number of visible occupied leks within 3 miles of alignments	31	8	-
Number of visible occupied leks within 4 miles of alignments	37	9	1

Table 6-10 identifies potential direct impacts by Project phase to sage-grouse based upon the TransWest Sage-grouse Analysis Framework and the five–factor analysis of potential threats to the species and its habitat contained in the USFWS's 12–month finding on petitions to list the species under the ESA. Evaluation of each potential direct impact upon local sage-grouse populations is based upon current scientific literature, professional agency biologist judgment, and information regarding Project development provided by the applicant.

Direct Impacts and Loss of Greater Sage–grouse

Mortalities Resulting from Electrocutions due to Collisions with Energized Components

Tables 6-11 and **6-12** summarize the factors used to assess direct and indirect Project-related impacts to greater sage-grouse, respectively. Wildlife mortalities as a result of electrocution can occur when the distance between phase conductors or the distance between grounded and energized hardware is less than the wrist to head span or head to foot distance of a bird (APLIC 2006). Under all Project alternatives, there would be no potential for electrocution of sage-grouse due to collisions with energized components of transmission lines because of the small wing span and height of sage-grouse relative to the proposed spacing of conductors and grounded elements. Electrocution risk within the analysis area is primarily associated with smaller (i.e., 60 kV or less) power lines, due to the size of towers and spacing of the wires

(APLIC 2006). For the proposed Project, the 345–kV lines associated with the ground electrode beds are the only components with electrocution potential.

Table 6-11 Factors for Evaluation of Potential Direct Impacts to Greater Sage–grouse

Factor	Potential Direct Impact	Project Phase	
		Construction	Operation
Direct Loss of Birds	Mortalities resulting from electrocutions due to collisions with energized components		X
	Mortalities resulting from collisions with Project infrastructure including transmission towers, conductors, lines, guy wires, or fences	X	X
	Mortalities resulting from collisions with construction equipment and vehicles	X	X
	Mortalities resulting from destruction of nests	X	
	Mortalities resulting from nest abandonment due to disturbance	X	X
Present or threatened destruction, modification, or curtailment of habitat or range	Loss of habitat resulting from construction of tower sites, access roads, terminal locations, and other ancillary facilities	X	X
	Fragmentation of sage-grouse habitat due to the construction of new access roads, removal of vegetation at tower sites, increased EMF, or introduction of tall structures	X	X
	Degradation of sage-grouse habitat and function	X	X
	General disturbance to sage-grouse and disruption of breeding activities due to human presence and noise	X	X
	Decreased nest initiation, nest success, and recruitment resulting from disruption of foraging, seasonal migration, breeding (lekking), nesting, brood rearing, and wintering activities	X	
	Interruption or adjustments to seasonal sage-grouse migrations and movements		X
	Reduction of sage-grouse habitat suitability resulting from the introduction and establishment of noxious weeds		X
Overutilization (harvest)	Increased un–authorized harvest resulting from increased access to sage-grouse habitat via construction of new access roads		X
Disease and predation	Potential for increased avian predation due to increased perching opportunity		X
	Potential for increased mammalian predation pressure resulting from habitat fragmentation and new predator movement corridors		X
Inadequacy of existing regulatory mechanisms	No direct impacts identified		
Other natural or man–made factors affecting the species continued existence	No direct impacts identified		

Table 6-12 Factors for Evaluation of Potential Indirect Impacts to Greater Sage–grouse

Factor	Potential Indirect Impact	Project Phase	
		Construction	Operation
Direct Loss of Birds	No indirect impacts identified		
Present or threatened destruction, modification, or curtailment of habitat or range	Reduction of sage-grouse habitat suitability resulting from the introduction and establishment of noxious weeds		X
	Avoidance of habitat due to potential increase in avian predation pressure		X
Overutilization (harvest)	Increased un–authorized harvest resulting from increased access to sage-grouse habitat via construction of new access roads		X
Disease and predation	Increased physiological stress and susceptibility to disease and predation resulting from human noise and presence	X	X
Inadequacy of existing regulatory mechanisms	No indirect impacts identified		
Other natural or man–made factors affecting the species continued existence	Degradation of sage-grouse habitat suitability resulting from the application of herbicides		X

Impacts to sage-grouse from electrocution would be minimized by the implementation of design feature TWE–30 (Chapter 3.0), in which TransWest commits to the construction of the transmission line and associated infrastructure consistent with APLIC 2006 recommendations. Conservation measure **WLF–8** (Chapter 3.0) would further minimize the potential impact of electrocution by requiring Project conformance with conservation measures recommended in APLIC 2012.

Mortalities Resulting from Collisions with Project Infrastructure Including Transmission Towers, Conductors, Lines, Guy Wires, or Fences

Avian mortality from collisions with power lines is well documented (Brown and Drewien 1995). While sage-grouse are predominantly a ground–dwelling species, the risk for collision during flight is heavily dependent upon power line sizes (e.g., 345–kV versus 600–kV) and locations such as locations between loafing and feeding areas or along migration routes. Highest collision probabilities appear to occur where sage-grouse typically fly between foraging and loafing habitats that are bisected with lower voltage overhead lines (SAIC 2001).

The potential for mortalities of sage-grouse as a result of in–flight collisions with transmission lines and towers would increase under all Project alternatives within occupied sage-grouse habitats. While quantitative information regarding the rates of sage-grouse collisions with towers and lines is generally lacking, factors influencing collision rates can include location, configuration, structure type, species specific behaviors, and environmental conditions (e.g., visibility, weather, topography) (APLIC 2006). Past research has shown that the static wire, also referred to as the shield or groundwire, has posed the greatest collision danger to birds (APLIC 2012; Faanes 1987). Most of the documented static-wire collisions occur when birds increase their altitude in apparent attempts to avoid conductor wires. Birds maneuvering to avoid the conductor wires actually increased collision risk and, in the absence of static wires, most collisions could have been avoided. Static wires on the larger (e.g., 500 kV and 600 kV) transmission lines, such as the proposed Project, are typically positioned at the top of the structures and therefore, pose less of a collision threat to low–flying sage-grouse. The greatest collision risks to sage-grouse from the proposed Project are the guy wires associated with each tower. The guy wires support the towers and are typically angled to the anchor point. Therefore, bird species, such as sage-grouse, could have a greater potential for collision risk because of the smaller wing to body ratio (i.e., heavy wing–load), resulting in lower flight heights and a greater occurrence of takeoffs and landings crossing guy wire heights. Because of their lack of flying efficiency, species such as the greater sage-grouse could be more likely to collide with the guy wires unless the wires are properly marked or even eliminated

in high use habitat areas (i.e., using self–supporting steel lattice structures or tubular steel monopoles instead of guyed lattice structures).

Documentation of direct mortality of sage-grouse resulting from collisions with transmission lines is limited. One study in Idaho showed that a substantial proportion of annual mortality can be caused by transmission line collisions. Beck et al. (2006) monitored survival of 15 radio–collared juvenile sage-grouse in the Medicine Lodge area of Clark County, Idaho and 43 juvenile sage-grouse in the Table Butte area of Clark and Jefferson counties, Idaho in 1997 and 1998. Although all mortality documented in the Medicine Lodge area was attributed to predation, 33 percent of the juvenile mortality (two of the six fatalities) in the Table Butte area was attributed to collisions with transmission lines. The frequency of sage-grouse collisions with transmission lines is difficult to evaluate and juvenile mortality in the Table Butte area could have been more of a function of available habitat and the specific location of the transmission line rather than the transmission line design itself (i.e., transmission line was not sited properly to avoid important habitats). In addition, a majority of transmission lines are located in remote areas with little human presence and dead birds are often picked up by scavengers before humans are able to find and report them; therefore, reported losses must be considered a superficial measure of actual collision mortality (Faanes 1987; Longridge 1986; Thompson 1978).

A majority of literature on power line impacts has been derived from studies that looked at several different facilities associated with energy development (e.g., oil and gas well pads, access roads, compressor stations, power lines, etc.). Additionally, due to very limited data on collision mortality of sage-grouse from power lines, it cannot be determined if collision rates vary by capacity of power lines.

Impacts to sage-grouse from collisions with Project infrastructure would be minimized by the implementation of design feature TWE–30 (Chapter 3.0), in which TransWest commits to the construction of the transmission line and associated infrastructure consistent with APLIC 2006 recommendations. Conservation measure **WLF–8** would further minimize the potential for electrocutions by requiring Project conformance with conservation measures recommended in APLIC 2012. These measures, along with both the general and site-specific measures discussed under **SSWS–5**, would require TransWest to implement several actions to avoid and minimize potential impacts to the greater sage-grouse and its habitat.

Marking guy wires would increase the visibility of these wires and would reduce the potential for collisions, especially in areas between important roosting and foraging habitat. A study in South Carolina involving two 115–kV transmission lines showed that the bird collision rate was 53 percent lower for marked transmission lines versus unmarked transmission lines (Savereno et al. 1996). The study concluded that aviation markers were effective at increasing the transmission line visibility and reducing bird collisions. Alternatively, constructing alternative structures such as self–supporting steel lattice structures instead of guyed lattice structures would eliminate the collision potential from guy wires to sage-grouse.

The feasibility of using alternative transmission tower structure types within areas designated as high quality sage-grouse habitat depends on multiple factors. Engineering constraints that may limit the use of self–supporting structures can include, but are not limited to: extreme topography, unstable or erodible soils, local geology, and local hydrology. Other resource considerations that also may determine the applicability of alternative self–supporting structures can include but are not limited to: local recreation patterns (e.g., designated recreational OHV or snowmobile trails), sensitive vegetation communities, and sensitive visual resources. Determinations of appropriate structure types will be made in coordination with the appropriate land and resource management agencies during development of the Notice to Proceed POD as outlined in Section 2.3.1.

Mortalities Resulting from Collisions with Construction Equipment and Vehicles

Sage-grouse mortality resulting from collisions with construction equipment would likely be very low. Equipment used in transmission line construction generally moves at a slow rate or is stationary for long periods (e.g., cranes). The potential for sage-grouse mortalities resulting from collisions with vehicles traveling on project access roads is higher than the risk associated with construction equipment and increases proportionally with the speed of each individual vehicle. Road conditions also can affect the rate of collisions as vehicle speeds tend to be lower on unimproved and one–lane roads. The risk of direct mortality to sage-grouse from collisions with equipment and vehicles during construction and maintenance is most likely limited to nesting hens or young chicks that have limited mobility.

Impacts to sage-grouse from collisions with construction vehicles and equipment would be minimized by the implementation of design feature TWE–34 (Chapter 3.0), in which TransWest commits to providing training to all Contractor and Subcontractor personnel and others involved in construction activities occurring within occupied sage-grouse habitat. Furthermore, the implementation of conservation measure **SSWS–5** would require TransWest to restrict construction and maintenance vehicle speeds to 15 mph when traveling on unimproved Project roads within occupied sage-grouse habitat. This would reduce the potential for sage-grouse collisions with vehicles and equipment.

Mortalities Resulting from Destruction of Nests

All Project action alternatives would result in construction and operation of the Project within habitats suitable for sage-grouse nesting. The potential for mortalities of nesting sage-grouse resulting from the destruction of active nests exists due to the amount of habitat crossed by each alternative. This potential is limited by seasonal restrictions of construction and operation activities, which would be applied to sage-grouse habitat within 4 miles of active leks as listed in Final EIS Appendix C, Tables C.3–1 through C.3–29. Research conducted in Colorado, Idaho, and Wyoming suggests that approximately 80 percent of sage-grouse nests are located within 4 miles of the lek where breeding occurs (CGSSC 2008). Conservation measures outlined under **SSWS 5** would further minimize the potential impact of nest destruction by requiring the siting of the transmission line away from breeding and nesting habitats to the extent practicable. If active nests located outside of the 4-mile lek buffer are encountered during construction or maintenance activities, TransWest has committed to implementing design feature TWE-34 (Appendix C), which would require immediate coordination with the appropriate land management agency's biologists to ensure adequate protection is afforded to the resource. Currently, state wildlife management agencies do not have a standard recommended buffer for active sage-grouse nests located outside of the 4 mile seasonal restrictions; therefore, any buffers applied would be on a case–by–case basis in coordination with the appropriate state agency biologists. Implementation of proposed mitigation measure **SSWS–5.4** would further reduce potential impacts to breeding and nesting greater sage-grouse by prohibiting disruptive construction and maintenance activities within four miles of active leks during the breeding season. These design features and protection measures are anticipated to minimize direct impacts to nesting sage-grouse. TransWest has committed to implementing design feature TWE–34 (Chapter 3.0), which would require immediate coordination with the appropriate land management agency's biologists to ensure adequate protection is afforded to the resource. These design features and protection measures are anticipated to minimize direct impacts to nesting sage-grouse.

Mortalities Resulting from Nest Abandonment due to Disturbance

Sage-grouse display one of the lowest nest success rates of all upland game birds and hens have been observed abandoning active nests due to human disturbance and ground disturbing activities within a certain proximity (Schroeder 1997) and the presence of livestock (Crawford et al. 2004). The potential for nest abandonment can be ameliorated by implementation of seasonal restrictions for construction and operation activities applied to sage-grouse habitat within 4 miles of active leks, as listed in Table C.3–1

through C.3–29 located in Final EIS Appendix C. Conservation measures outlined under **SSWS–5** would further minimize the potential impact of nest destruction by requiring the siting of the transmission line away from breeding and nesting habitats to the extent practicable. If active nests located outside of the 4–mile timing restrictions are encountered during construction or maintenance activities, TransWest has committed to implementing design feature TWE–34 (Chapter 3.0), which would require immediate coordination with the appropriate land management agency's biologists to ensure adequate protection is afforded to the resource. These design features and protection measures are anticipated to minimize direct impacts to nesting sage-grouse.

Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range

Loss of Habitat Resulting from Construction of Tower Sites, Access Roads, Terminal Locations, and Other Ancillary Facilities

Under all Project action alternatives, construction activities could result in permanent habitat loss, fragmentation, and the temporary displacement of sage-grouse from construction areas due the removal of native sagebrush vegetation, noise, and increased human activity. Sage-grouse may avoid previously occupied areas due to noise and disturbance from vehicle traffic (Lyon and Anderson 2003). The disturbance and degradation of sagebrush can reduce habitat carrying capacity for local breeding populations of sage-grouse, especially in areas where high quality sagebrush habitat is limited (Braun 1998; Connelly et al. 2000). Alternatively, sage-grouse may simply avoid otherwise suitable habitat as the density of roads and transmission lines increases (Holloran 2005).

The potential for disturbance of suitable sage-grouse lekking and breeding habitat can be ameliorated by implementing seasonal restrictions of construction and operation activities applied to sage-grouse habitat within 4 miles of active leks as listed in Table C.3–1 through C.3–29 located in Final EIS Appendix C. Conservation measures outlined under **SSWS–5** would further minimize the potential impact of nest destruction by requiring the siting of the transmission line away from breeding and nesting habitats to the extent practicable. These design features and protection measures are anticipated to minimize direct impacts to nesting sage-grouse.

Fragmentation of Greater Sage–grouse Habitat due to the Construction of New Access Roads, Removal of Vegetation at Tower Sites, Increased EMF, Introduction of Tall Structures

Transmission lines could cause sage-grouse to abandon otherwise suitable habitat or disrupt movement patterns among seasonal habitats (SAIC 2001). Transmission lines might also serve as barriers to movement as a result of avoidance behavior (Desholm and Kahlert 2005; Robel et al. 2004). Production of EMF by transmission lines also has been associated with avoidance of otherwise suitable habitat by avian species (Fernie and Reynolds 2005). Sage-grouse and other prairie gallinaceous birds have evolved in habitat largely devoid of tall structures. It is unclear how these species react to structure heights. Recent research in southern Wyoming has reported sage-grouse avoidance of brood–rearing habitats within 2.9 miles of transmission lines (LeBeau 2012). Knick et al. (2013) observed increased lek activity and persistence in areas of sage-grouse habitat characterized as having lower densities of transmission lines in comparison to sage-grouse habitats with increased densities of transmission lines and infrastructure. Studies completed on greater and lesser prairie–chickens have suggested avoidance behavior associated with the height of transmission lines. This avoidance could create an unintentional buffer along the transmission lines and roads of at least 328 feet in width (and probably more) for prairie-chickens. There also appears to be avoidance in the placement of nests and leks (Pruett et al. 2009a,b). These studies showed that greater and lesser prairie–chickens were not only more likely to avoid transmissions lines but also less likely to nest, cross, or maintain a home range near transmission lines (Pruett et al. 2009a,b). The movement of prairie–chickens was shown to be altered by the transmission lines, creating habitat fragmentation (Pruett et al. 2009a,b). These conclusions are derived from research on greater and lesser prairie chickens, a species that is similar in some aspects of life histories to sage-

grouse and therefore might not be representative of potential sage–grouse behavioral responses to the introduction of tall structures.

Degradation of Greater Sage–grouse Habitat and Function

Construction of the Project under all action alternatives would result in the degradation of sage-grouse habitat function. Removal of vegetation at tower locations, new access roads, and other work areas and facilities would result in the loss of and/or degradation to suitable sage-grouse habitat. Areas of vegetation removal would be minimized through the use of existing access road networks and the restoration of areas temporarily disturbed during construction activities in accordance with land management agency or private landowner requirements. The long-term loss of suitable sage-grouse habitat would be limited to those areas included in the operation and maintenance of the transmission line. However, as discussed in Final EIS Appendix D, it is anticipated that, upon decommissioning of the Project, reclamation measures would result in the return of impacted areas to native habitats. Herbaceous (grass and forb–dominated) vegetation communities would be expected to return to a native state within a relatively short period of time (e.g., 5 years). Other more diverse and slow–growing habitats such as sagebrush shrublands could require up to 50 years or longer before returning to native conditions.

General Disturbance to Greater Sage–grouse and Disruption of Breeding Activities due to Human Presence and Noise

Construction activities could result in permanent habitat loss, degradation, fragmentation, and the temporary displacement of sage-grouse from construction areas due to noise and increased human activity. The disturbance and degradation of sagebrush habitat can reduce its carrying capacity and adversely affect local breeding populations of sage-grouse, especially in areas where high quality sagebrush habitat is limited (Braun 1998; Connelly et al. 2000). Alternatively, sage-grouse may simply avoid otherwise suitable habitat as the density of roads and transmission lines increases (Holloran 2005).

This impact would be minimized by the application of species–specific agency conservation measures and timing limitations, as listed in Final EIS Appendix C and conservation measures outlined under **SSWS–5** would further minimize the potential impact of nest destruction by requiring the siting of the transmission line away from breeding and nesting habitats to the extent practicable Implementation of proposed mitigation measure **SSWS–5.4** would further reduce potential impacts to breeding and nesting greater sage-grouse by prohibiting disruptive construction and maintenance activities within four miles of active leks during the breeding season. These design features and protection measures are anticipated to minimize direct impacts to nesting sage-grouse. Implementation of **SSWS–15** would protect sage-grouse by requiring the Contractor to immediately notify the appropriate land management agencies and provide the location and nature of the finding. Construction in the vicinity of the bird(s) would be halted and would not resume until a biologist from the appropriate agency determines that the bird(s) would not be affected by continued construction.

Decreased Nest Initiation, Nest Success, and Recruitment Resulting from Disruption of Foraging, Seasonal Migration, Breeding (Lekking), Nesting, Brood Rearing, and Wintering Activities

Sage-grouse may avoid previously occupied areas due to noise and disturbance from vehicle traffic as evidenced by the observed rates of decline in male sage-grouse lek attendance, which have been reported to be correlated to traffic volumes on roads within proximity to active leks (Lyon and Anderson 2003). Depending on the season, displacement could impact lekking, nesting and brood–rearing hens, and birds on winter ranges. Sage-grouse that are displaced by construction activities might move to areas with lower quality habitat, resulting in an overall effect of reduced survival, nest initiation, and

breeding success. Fragmentation of sagebrush habitats also could interrupt the gene flow between distinct isolated areas of suitable breeding habitat.

Interruption or Adjustments to Seasonal Greater Sage–grouse Migrations and Movements

Under all Project action alternatives, the potential for causing interruption of or adjustments to sage-grouse migrations between seasonally important habitats could occur as a result of construction and operation activities within occupied sage-grouse habitats. Depending on the season, displacement and avoidance of areas near the transmission line could impact birds on leks, nesting and brood–rearing hens, and birds on winter ranges. This potential shift in behavior would represent a functional fragmentation of otherwise suitable sage-grouse habitat and could result in reduced breeding activity, nest initiation, brood–rearing success, and recruitment. The effects of fragmentation of sage-grouse habitat could further result in reduced gene flow between populations within the Project vicinity as the majority of gene flow is likely the result of movement of individuals between neighboring leks and populations, not the long distance migrations of individuals across larger portions of the species range (Oyler–McCance et al. 2005). Connectivity amongst leks has been observed to be a significant contributor to population stability and persistence (Knick and Hanser 2011; Knick et al. 2013).

Project design feature TWE–32 would require TransWest to identify sensitive areas to sage-grouse (e.g., leks, nesting habitat, wintering habitat, etc.) and implement seasonal timing restrictions and protection buffers. Conservation measures outlined under **SSWS–5** would require the siting of the transmission line ROW to be coordinated with appropriate wildlife management agencies in order to avoid areas of sage-grouse nesting and brood-rearing habitat within 4 miles of active leks to the extent practicable. Implementation of proposed mitigation measure **SSWS–5.4** would further reduce potential impacts to breeding and nesting greater sage-grouse by prohibiting disruptive construction and maintenance activities within 4 miles of active leks during the breeding season. These design features and protection measures are anticipated to minimize direct impacts to nesting sage-grouse.

Reduction of Greater Sage–grouse Habitat Suitability Resulting from the Introduction and Establishment of Noxious Weeds

Additional impacts from transmission line construction and associated access roads (e.g., two–tracks, mowed or cleared access ways) could include the reduction of sage-grouse habitat quality resulting from the spread of invasive and noxious plant species (Gelbard and Belknap 2003; SAIC 2001). This potential impact can adversely affect sage-grouse recruitment as invasive and noxious plants could out–compete native forbs, which sage-grouse rely on for forage during brood–rearing. Noxious weeds invasions within sagebrush vegetation communities also have resulted in the increase of number and frequency of wildfires that have widespread detrimental effects upon greater sage-grouse habitat conditions (West and Yorks 2002; Crawford et al. 2004). Big sagebrush communities invaded by cheat grass have estimated mean fire return intervals of 10 years in many areas, whereas the natural fire regime is conservatively estimated to be 10 to 20 times longer (Connelly et al. 2004). Areas of big sagebrush that experience increased fire frequencies often result in removal of sagebrush canopy

Implementation of conservation measures **NX–1** and **NX–2** (Table C.5–1, Final EIS Appendix C) would minimize impacts to sage-grouse habitat associated with the potential introduction or spread of noxious weeds and invasive plant species. These measures would be implemented in coordination with the development of a Noxious Weed Management Plan as described in Table 9 of Final EIS Appendix D. This plan would be developed in accordance with appropriate land management agencies' standards and would be consistent with agency permitting stipulations for the control of noxious weeds and invasive species (EO 13112). Measures included in the plan could include, but would not be limited to, the washing of construction equipment and vehicles prior to arriving within the construction area and mechanical removal or herbicide treatments of existing weed populations. These measures would substantially reduce the potential for the establishment of new weed invasions and the further spread of

existing weed populations within sage-grouse habitat located along the Project. However, the spread of noxious and invasive weeds could continue to occur even with the implementation of the Noxious Weed Management Plan.

Overutilization

Recreational hunting of sage-grouse populations within the analysis area occurs in Wyoming and Colorado. The hunting of four specific sage-grouse populations in Utah is currently legal, although none of these populations would be crossed by any of the Project alternatives. Recreational hunting is not considered to be a principal cause of range–wide declines in sage–grouse populations and the USFWS did not determine state hunting regulations to be inadequate in the 12–month findings on petitions to list the species under the ESA (75 FR 13910). Utah, Colorado, and Wyoming state wildlife agencies regulate hunting of sage-grouse with the primary goal of establishing hunting seasons and take limits that support the long term growth and sustainability of local populations (CGSSC 2008; Christiansen 2010; UDWR 2009).

Implementation of Project design feature TWE–33 would reduce any potential impacts to sage-grouse from unauthorized harvest by Project construction and maintenance personnel by providing mandatory sensitive species awareness training which includes information regarding applicable hunting regulations and other wildlife conservation measures. Overutilization is not discussed further in this document.

Disease and Predation

Potential for Increased Avian Predation due to Increased Perching Opportunity

The level of perching opportunity for avian predators within the Project analysis area is anticipated to increase under all Project alternatives. Avian predators, particularly raptors and corvids, are attracted to overhead utility lines because they provide perches for various activities, including hunting (APLIC 2006). Transmission towers increase a raptor's range of vision, allow for greater speed during attacks on prey, and serve as territorial markers (APLIC 2006; Manville 2002; Steenhof et al. 1993). Most research on power lines and raptor and corvid populations has documented a positive relationship between power lines and increased perches and nest sites. Although a direct correlation between power lines and increased predation risks for sage-grouse has not been documented, sage-grouse may avoid power lines due to increased predation risk (Lammers and Collopy 2007). It also is important to note that in some regions of the U.S., sage-grouse are an important food item for raptor species (i.e., golden eagles). This is especially true when other prey populations are exhibiting down cycles (e.g., black–tailed jackrabbit, white–tailed prairie dog, etc.). Golden eagles follow sage- grouse during their seasonal migrations and numerous researchers have documented golden eagle predation on sage-grouse (Gibson and Bachman 1992; Schroeder et al. 1999). Although the majority (80 to 90 percent) of golden eagle predation occurs on mammalian species (Kochert et al. 2002), predation of male birds at leks can be substantial in certain areas, especially if other prey populations are currently low. Golden eagles have been observed to prey on sage–grouse opportunistically, and typically hunt sage–grouse by swooping from a high soar (Kochert et al. 2002; Watson 1997). Consequently, power poles may not play an important role in eagle predation of sage–grouse. Golden eagles often fly over and attack birds on leks, disrupting lek behaviors and scattering birds (Hartzler 1974; Jenni and Hartzler 1978). Other documented avian predators of sage-grouse or their nests include black–billed magpie, common raven, ferruginous hawk, red–tailed hawk, rough–legged hawk, Swainson's hawk, gyrfalcon, and northern goshawk (Schroeder et al. 1999). Although the authors caution that results are preliminary and yet to be peer reviewed, recent research conducted for the Sierra Pacific Power Company's Falcon-Gondor transmission line suggests that sage-grouse nests with more total shrub cover had a greater probability of success than nests with less cover, regardless of distance from the transmission line (Blomberg et al. 2010; Nonne et al. 2013). Kolada et al. (2009) reported higher sage-grouse nest success in California as shrub cover increased. Therefore, this research suggests that the risk of increased raptor and corvid predation on sage-grouse may be mitigated by maintaining and restoring sagebrush canopy cover, particularly within important nesting and brood–rearing habitat.

Potential for Increased Predation Pressure Resulting from Habitat Fragmentation and New Predator Movement Corridors

Under all Project action alternatives, construction of transmission lines and associated access roads (e.g., two–tracks, mowed or cleared access ways) would increase the availability of travel corridors for terrestrial mammalian predators (Gelbard and Belknap 2003; SAIC 2001). This development could increase predation rates of individual sage-grouse, nesting hens, and juvenile sage-grouse during brood–rearing periods. This impact would be minimized by the application of general and site-specific conservation measures outline **SSWS–5** are anticipated to reduce predation pressure resulting from construction and operation of the transmission line.

Inadequacy of Existing Regulatory Mechanisms

Under all Project action alternatives, existing regulatory mechanisms related to sage-grouse conservation and management would not be modified. All proposed Project activities are not anticipated to result in a reduction of adequacy of existing regulatory mechanisms. Furthermore, all Project activities would be consistent with all applicable existing statutory regulations and any future regulations currently under development by the BLM, USFS, and states in response to the USFWS 12–month findings on petitions to list the sage-grouse under the ESA. In the event that the sage-grouse is eventually listed under the ESA, the BLM would comply with its responsibilities as a federal agency by entering into formal Section 7 consultation with the USFWS for the species.

Other Natural or Man–made Factors Affecting the Species' Continued Existence

Secondary roads that are used more often to access construction areas also could result in traffic that can negatively impact sage-grouse through increased noise or vehicular and pedestrian harassment. New secondary access roads (i.e., two–tracks) that are not gated to restrict public access or reclaimed immediately following construction also could provide increased human access to previously inaccessible sage-grouse habitats, allowing for increased vehicle and pedestrian harassment at lek sites and increased hunting pressure. Ground disturbance associated with secondary road construction and use also increases the potential for noxious weed invasion and vehicles driving these roads could increase the possibility of igniting fires (Leu et al. 2008).The potential impacts of wildfire to vegetation communities is discussed in Section 3.21.5.

Indirect Impacts

Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range

Reduction of Greater Sage–grouse Habitat Suitability Resulting from the Introduction and Establishment of Noxious Weeds

This potential impact is discussed above under Direct Impacts.

Avoidance of Habitat Due to Potential Increase in Avian Predation Pressure

As discussed above, the potential for avian predation could increase under all action alternatives for the Project. Evidence supporting the theory that sage-grouse will avoid areas near power lines due to increased avian predation pressure is currently inconclusive. Preliminary results of the Falcon to Gondor study on sage-grouse did not report a connection between sage–grouse demographics (i.e., male survival and movement, female survival, pre–fledging chick survival, and nest survival) and proximity to the power line (Nonne et al. 2013). Although this study supports the idea that the impact of power lines

upon sage-grouse demographics and breeding behavior may not strongly impacted by the presence of power lines, the authors caution that these results are preliminary and that confounding factors of climatic conditions and wildfire may have affected observed results.

In northern California, power lines have had a negative impact on lek attendance and strutting activity has ceased on all leks within 1 mile of one particular power line, while other power lines located in sage-grouse habitat also are believed to be impacting populations (Bi–State Local Planning Group [Bi–State Plan] 2004). A study in Washington State found that 19 of 20 leks (95 percent) documented within 5 miles of 500–kV transmission lines are now vacant, while the vacancy rate for leks further than 5 miles is 59 percent (22 of 37 leks; Washington Department of Fish and Wildlife [WDFW] 2008). In Oregon, a 250–kV transmission line was constructed within 0.5 mile of a sage-grouse lek that had an average attendance of 41 males during the period 1949 to 1980. After the transmission line was constructed from 1981 to 1982, an average of only 5 males per lek was counted between 1982 and 2005, with no birds being counted on the lek since 2006 (Oregon Department of Fish and Wildlife [ODFW] 2009). The cause of this decline, or perhaps extirpation, cannot be directly linked to the transmission line but it is likely part of a cumulative effect from development in the area. It also was noted that the Oregon statewide sage-grouse population from 1980 to 1988 (the period when the lek declined) reached relatively high levels.

Based on the lack of specific research on power lines and ambiguity associated with results of many of these studies, it is not possible to ascertain the relative magnitude of indirect impacts based on capacity of the power line. To the extent that increased predation and harassment caused by raptors and corvids may influence sage-grouse use of adjacent habitats, there is probably little difference based on capacity of power lines, as all power lines provide opportunities for raptors and corvids to perch. It is likely that shorter towers used on 34.5–kV versus 500–kV lines would have less impact, but this cannot be confirmed based on available literature. It also is not known if smaller capacity lines result in less "behavioral" habitat fragmentation (i.e., fragmentation resulting from sage-grouse being more reluctant to cross 500–kV lines than 345–kV lines.

Implementation of site-specific conservation measures outlined under **SSWS–5** would help minimize the potential for increased predation on sage-grouse by limiting raptor and corvid perching locations through the installation of perch diverters and the development of a Raven Management Plan (Table C.5–1, Final EIS Appendix C). While power lines fitted with anti–perching devices do not necessarily eliminate perching entirely (Lammers and Collopy 2007) and there is no direct evidence that perch diverters successfully reduce avian predation of sage-grouse, they are designed to discourage use of the power line as a hunting perch which could in turn decrease the potential for predation by raptors and corvids on sage-grouse.

Disease and Predation

Increased Physiological Stress and Susceptibility to Disease and Predation Resulting from Human Noise and Presence

Under all Project action alternatives, the potential for an increase in the susceptibility of sage-grouse to disease and predation resulting from the stress induced by human presence and noise during construction and maintenance activities could occur. Research of avian physiological responses to disturbance has observed measured declines in individual body condition resulting from increases of blood corticosteroid levels (Siegel 1980). Reductions of sage-grouse populations studied in southwestern Wyoming have been attributed to influences of natural gas infrastructure on the survival levels of sage-grouse hens (Holloran 2005).

Most research on power lines and raptor and corvid populations has documented a positive relationship between power lines and increased perches and nest sites. Although a direct correlation between power lines and increased predation risks for sage-grouse has not been documented, sage-grouse may avoid power lines due to increased predation risk (Lammers and Collopy 2007).

Inadequacy of Existing Regulatory Mechanisms

No indirect impacts are identified.

Other Natural or Man–made Factors Affecting the Species' Continued Existence

Degradation of Greater Sage–grouse Habitat Suitability Resulting from the Application of Herbicides

Ground disturbance would occur under all Project action alternatives resulting in the potential increase for establishment of noxious weeds. Noxious weeds are discussed above under Direct Impacts. The potential application of herbicides to prevent, control, and remove noxious weeds would be coordinated through the development of the Project's Noxious Weed Management Plan (Design Feature TWE–26) as described in Final EIS Appendix D, Table 9. This plan would be developed in accordance with appropriate land management agencies' standards and would be consistent with agency permitting stipulations for the control of noxious weeds and invasive species (EO 13112).

Implementation of general conservation measure **SSWS–5.6** and design feature TWE-26 would require that TransWest coordinate the use of all herbicides in sage-grouse habitat under the Noxious Weed Management Plan with all applicable federal and state wildlife management agencies prior to application. This would ensure that no unanticipated impacts to sagebrush understory vegetation communities would occur as a result of construction, operation, and vegetation management actions. In addition, implementation of conservation measure **VEG–1** would aid in reclamation activities and restoring communities (i.e., sagebrush shrubland) to native ecosystems, especially in areas where reclamation is difficult.

Cumulative Effects

No reasonably foreseeable non-federal actions have been identified within the vicinity of the proposed Project action area for the greater sage-grouse.

Offsite Compensatory Mitigation

In an effort to comply with BLM IM 2012–043 guidance, the BLM has developed a framework for impact analysis that is focused on the listing factors considered by the USFWS for evaluating future listing and protection of sage-grouse under the ESA. As part of the framework, consideration of compensation for both short–term and long–term direct and indirect loss of sage-grouse and its habitat will be included in the TransWest Sage-grouse Mitigation and Habitat Equivalency Analysis Plan. This framework is included in Appendix J of the Final EIS. This plan will be completed upon the final assessment of the full range of impacts resulting from the construction, operation, and maintenance of the Project. Furthermore, the framework specifies the use of Habitat Equivalency Analysis (HEA), conducted by TransWest, as a standardized basis for determining a 1–to–1 ratio for habitat services lost or mitigated. TransWest intends to continue compliance with BLM IM 2012–043 through considering the implementation of both on–site and off–site compensatory mitigation measures developed during the HEA process.

Overview of Habitat Equivalency Analysis

The HEA is a process of quantifying interim and permanent habitat disturbance, measured as a loss of habitat services from pre–disturbance conditions, and scaling compensatory habitat requirements to those disturbances (Dunford et al. 2004; King 1997; Kohler and Dodge 2006; NOAA 2009, 2006).

Habitat services are generally quantified using a metric that is representative of the functionality or quality of habitat (i.e., the ability of that habitat to provide wildlife "services" such as nest sites, forage, cover from predators, etc.). When wildlife habitat is the primary service of interest, areas with the highest habitat service levels are those areas with highest habitat quality. Interim (or short–term) habitat

disturbances are those services that are absent during certain phases of the Project that would have been available if that disturbance had not occurred (e.g., temporary vegetation losses, temporary soil partitioning, temporary displacement of wildlife populations). Permanent (or long–term) habitat disturbances are those that remain after Project construction and interim reclamation and recovery are complete (e.g., permanent vegetation loss, permanent loss of wildlife or fisheries populations, irrecoverable impacts to soils or water as a result of contamination). The benefits of applying HEA to the Project are that:

- The approach has been thoroughly evaluated and documented in scientific literature and has been tested in multiple court cases.
- It provides a quantitative analysis of direct and indirect impacts.
- It provides a standard framework for developing appropriate mitigation ratios.
- It is applicable to any ecosystem type where appropriate habitat service metrics can be defined.

Upon completion of the HEA, TransWest will work with cooperating agencies and stakeholders to develop conservation measures that can be used to compensate for the interim and permanent losses of habitat services resulting from project construction, operation, and maintenance. Mitigation measures likely to be considered include, but are not limited to:

1. Fence marking, modification, or removal – Fences would be marked, modified, or removed to reduce or remove threats to sage-grouse. Marking would be prioritized in areas near leks, in winter concentration areas, in known migration corridors, or in areas between known roosting and foraging habitats.
2. Sagebrush restoration or enhancement projects – Sagebrush restoration or enhancement projects might include seeding sagebrush and associated understory vegetation into previously disturbed or burned areas or transplanting already established sagebrush stems and seedlings into areas where sagebrush has been removed or thinned. Appropriate land management agency or landowner coordination would be important to ensure sagebrush enhancement activities support ongoing and future land use objectives.
3. Understory improvement projects – Understory habitat conditions could be improved by over–seeding existing sage-grouse habitats with appropriate forbs, grasses, or other desirable plant species; seeding previously disturbed areas with forbs and grasses to create a suitable mosaic of habitat for various life stages of sage-grouse; removing undesirable non–native understory species; or improving residual cover of existing understory species to increase cover and improve nest success.
4. Conifer removal – In areas where conifers are encroaching into suitable sage-grouse habitat, conifer removal (specifically removal of pinyon pine and juniper) could be used to reduce habitat fragmentation and to restore previously unsuitable habitat.
5. Brood–rearing habitat improvement – During summer months, mesic habitats adjacent to appropriate cover are necessary for brood–rearing and summer use. In areas where these habitats have been removed, altered, or are not available for other reasons, habitat enhancements focused on restoring or creating mesic habitats could be used to improve brood–rearing conditions.
6. Conservation easements – Where possible, conservation easements could be used to provide long–term contractual protection of high–quality sage-grouse habitat, conservation efforts, and improvement projects. TransWest's ability to acquire conservation easements would be dependent upon the willingness of private landowners to participate in a conservation program. Landowner coordination would be important to ensure that activities support ongoing and future land use objectives.

After considering design features and conservation measures, remaining Project construction and operation impacts to the greater sage-grouse would be limited to habitat loss, fragmentation, potential mortality from collisions, and disturbance during routine maintenance activities. This disturbance is anticipated to have little impact, given the linear nature of the Project and extent of native habitats in the surrounding Project region.

Monitoring

There are currently no known short- or long-term monitoring and reporting plans for greater sage-grouse specific to the Project analysis area; however, State wildlife agencies conduct long-term lek monitoring activities throughout the analysis area.

Determination

The greater-sage grouse is a candidate for ESA listing and therefore no determination of effects is required.

6.4 Platte River Species

The effects of potential water depletions are analyzed on five species (least tern, piping plover, whooping crane, pallid sturgeon, and western prairie fringed orchid), which occur in the Platte River in Nebraska. These species are grouped together because the only impact issue is potential water depletions. There would be no direct disturbance from the Proposed Action, since their occupied habitat is located a considerable distance downstream of the Project corridors in Wyoming.

6.4.1 Environmental Baseline

6.4.1.1 Conservation Status

Least Tern (Endangered – Interior Population)

The interior least tern was designated as endangered on May 28, 1985 (50 FR 21784). No critical habitat has been designated for this subspecies. The Interior Least Tern Recovery Plan was issued in September 1990.

Historically, the breeding range of this species extended from Texas to Montana and from eastern Colorado and New Mexico to southern Indiana. It included the Rio Grande, Red, Missouri, Arkansas, Mississippi, and Ohio river systems. The interior least tern continues to breed in most of the historic river systems, although its distribution generally is restricted to less altered river segments (USFWS 1990b).

The proposed Project disturbance areas in Wyoming are located a considerable distance from the Platte River habitat for this species in Nebraska. Population status and trends for the least tern (interior population) are not presented in this document because the only potential effect to the species from the proposed Project is water depletion, as analyzed below. No critical habitat has been designated for the least tern in the Platte River system.

Piping Plover (Threatened – Northern Great Plains Population)

The piping plover was designated as endangered/threatened on December 11, 1985 (50 FR 50726). The Great Lakes piping plover population was listed as endangered while the remaining Atlantic and northern Great Plains populations were listed as threatened. Migrating and wintering populations of piping plover also were classified as threatened. Designated critical habitat for the piping plover does not exist within the special status wildlife analysis area. A recovery plan for the Great Lakes and Northern Great Plains Piping Plover populations was issued on May 12, 1988. 1 The 5–Year Review for this population was issued in September 2009.

The proposed Project disturbance areas in Wyoming are located a considerable distance from the Platte River habitat for this species in Nebraska. Population status and trends for the piping plover (northern Great Plains population) are not presented in this document because the only potential effect from the proposed Project is water depletion, as analyzed below. No critical habitat has been designated for northern Great Plains population of the piping plover in the Platte River system.

Whooping Crane (Endangered)

The whooping crane was listed as endangered on March 11, 1967 (32 FR 4001). In May 2007, the third revision of the Whooping Crane Recovery Plan was issued (72 FR 29544). Critical habitat for the whooping crane is not present in the special status wildlife analysis area (USFWS 2012x). As of August 2011, the total population of whooping cranes in the wild was estimated at 437.

Whooping cranes nest in, and adjacent to, the Aransas-Wood Buffalo National Park (AWBP) in Canada, and winter in coastal marshes in Texas at the Aransas NWR (USFWS 2012x). During spring and fall migration, the AWBP whooping crane population migrates through the central Great Plains. Birds from the AWBP population depart from their wintering grounds in Texas starting in late March through the beginning of May. Fall migration typically begins in mid-September, with most birds arriving on wintering grounds between late October and mid-November (CWS and USFWS 2007).

The proposed Project disturbance areas in Wyoming are located a considerable distance from the Platte River habitat for this species in Nebraska. Population status and trends for the whooping crane are not presented in this document because the only potential effect from the proposed Project is water depletion, as analyzed below. Critical habitat for this species occurs along Nebraska portions of the Platte River between Lexington and Dehman, Nebraska (USFWS 1978).

Pallid Sturgeon (Endangered)

Pallid sturgeon was listed as endangered in 1990 (55 FR 36641) and a recovery plan was published in 1993 (USFWS 1993). Downstream portions of the Platte River in Nebraska contain occupied habitat for the pallid sturgeon. This species has been collected in the Lower Platte River defined as downstream of the mouth of the Elkhorn River. The upper end of occupied habitat for the pallid sturgeon is more than 350 miles downstream of the refined transmission corridors in Wyoming. No critical habitat has been designated for this species in the Platte River.

The pallid sturgeon is a bottom-dweller that occurs in areas with strong current and firm sandy bottoms in the main channel of large turbid rivers (Platte River Recovery Implementation Program 2014). Studies in the Platte River and elsewhere have determined that pallid sturgeon mainly use the downstream edges of sand and gravel bars and submerged dunes, which are formed primarily during high flows (Bureau of Reclamation and USFWS 2006). This species is slow-growing and late-maturing fish that feeds on small fishes and aquatic invertebrates.

Pallid sturgeon can be long-lived, with females reaching sexual maturity later than females. Based on wild fish, the estimated age for initial reproduction was 15 to 20 years for females and 5 years for males (Keenlyne and Jenkins 1993, as cited in USFWS 2014c). Spawning occurs between March and July, depending on temperature conditions. The suspected spawning habitat occurs over coarse substrate or bedrock in relatively deep water with relatively fast flows (USFWS 2014c). Adult pallid sturgeon can move considerable distances upstream prior to spawning. Newly hatched larvae are predominantly pelagic and drift with currents for considerable distances (up to 125 miles).

Western Prairie Fringed Orchid (Threatened)

Western prairie fringed orchid was listed as threatened pursuant to the ESA on September 28, 1989 (54 FR 39857 39863). The western prairie fringed orchid is a perennial orchid of the North American tall grass prairie occurring in North Dakota, Minnesota, Iowa, Missouri, Kansas and Nebraska. The total population size has been estimated at four large populations each containing over 1,000 individuals.

The proposed Project disturbance areas in Wyoming are located a considerable distance from the Platte River habitat for this species in Nebraska. Population status and trends for the western prairie fringed orchid are not presented in this document because the only potential effect to the species is from water depletion, as analyzed below.

6.4.1.2 Life History and Habitat Association

Least Tern (Endangered – Interior Population)

The interior least tern breeds and forages on barren or sparsely vegetated sandbars adjacent to waterbodies. This species breeds in colonies on sandy or pebbly, sparsely vegetated islands or shorelines. Interior least terns spend 4 to 5 months at their breeding sites. Nest locations are usually well above the water's edge, since nesting is typically initiated during high river flows, when only small amounts of sandy shoreline are exposed. Therefore, the size of nesting habitat depends on water levels and the extent of associated sandbars. The interior least tern also will nest on artificial habitats, including sand and gravel pits and dredge islands (USFWS 1990b).

Piping Plover (Threatened – Northern Great Plains Population)

The piping plover breeds and forages on sandy lakeshore beaches, sandbars within riverbeds, or wet, sandy pastures. Nesting habitat for the piping plover consists of sparsely vegetated shorelines around small alkali lakes; large reservoir beaches; river islands and adjacent sandpits; and shorelines associated with industrial ponds. It constructs a scrape nest in sand or gravel (Haig and Plissner 1993). Nesting piping plovers have been found in least tern nesting colonies at a number of sites on Great Plains river sandbars and sand pits (USFWS 1988b).

Whooping Crane (Endangered)

Whooping cranes utilize a variety of habitats during migration, including freshwater marshes; wet prairies; shallow portions of rivers, reservoirs, lakes, and lagoons; and forage in grain and stubble fields. Whooping cranes roost on submerged or barren sandbars.

Pallid Sturgeon (Endangered)

Pallid sturgeon can be long-lived, with females reaching sexual maturity later than females. Based on wild fish, the estimated age for initial reproduction was 15 to 20 years for females and 5 years for males (Keenlyne and Jenkins 1993, as cited in USFWS 2014c). Spawning occurs between March and July, depending on temperature conditions. The suspected spawning habitat occurs over coarse substrate or bedrock in relatively deep water with relatively fast flows (USFWS 2014c). Adult pallid sturgeon can move considerable distances upstream prior to spawning. Newly hatched larvae are predominantly pelagic and drift with currents for considerable distances (up to 125 miles).

Western Prairie Fringed Orchid (Threatened)

The species occupies wet, mesic sub-irrigated prairies and sedge meadows along the floodplain of the Platte River. Alterations to the peak flows of the Platte River have facilitated the conversion of most low-lying areas near the river from grassland to intensive agriculture (Sidle and Faenes 1997). Thus, little habitat remains that is suitable for the species along the Platte River.

6.4.1.3 Threats

Threats to the interior lease tern, piping plover, whooping crane and its critical habitat, pallid sturgeon, and western prairie fringed orchid are not discussed in this document because the only potential effect to the species from the proposed Project is from water depletion, as analyzed below.

6.4.1.4 Recovery

Recovery objectives and criteria for the interior least tern, piping plover, whooping crane and its critical habitat, pallid sturgeon, and western prairie fringed orchid are not discussed in this document because the only potential effect to the species from the proposed Project is from water depletion, as analyzed below.

6.4.2 Assessment of Effects

6.4.2.1 Area of Analysis

The analysis area for the least tern, piping plover, whooping crane, pallid sturgeon, and western prairie fringed orchid, collectively referred to as the target species, includes potential water diversion points in the North Platte Basin and continues downstream to the Platte River basin. The upper end of occupied habitat for these species is located in the Platte River in Nebraska at a considerable distance from the closest refined transmission corridor. No critical habitat for the piping plover, least tern, pallid sturgeon, or western prairie fringed orchid occurs in the Platte River system. Critical habitat for the whooping crane is designated in the Platte River system in Nebraska. The analysis area would exclude the transmission corridors and the potential disturbance area beyond the corridors, since there is no occupied habitat that is crossed by the refined transmission corridor and the engineered alignment.

6.4.2.2 Conservation Measures

No additional protection measures are proposed for the federally listed Platte River species or whooping crane critical habitat.

6.4.2.3 Direct and Indirect Effects

There would be no direct effects on the least tern, piping plover, whooping crane, pallid sturgeon, or western fringed orchid, since the occupied habitat for these species is located in the Platte River system in Nebraska. The section of the Platte River that contains these species is located a considerable distance downstream of any construction or operation disturbance areas in Wyoming. In addition, any ground disturbance by construction or operation activities would not result in sediment or potential fuel spill effects on these species due to the considerable distance downstream to occupied or critical habitat.

The Platte River Recovery Implementation Program (PRRIP), established in 2006, is implementing actions designed to assist in the conservation and recovery of the target species and their associated habitats along the central and lower Platte River in Nebraska through a basin-wide cooperative approach agreed to by the States of Wyoming, Nebraska, and Colorado and the U.S. Department of the Interior [Program, I.A.1.]. The Program addresses the adverse impacts of existing and certain new water related activities on the Platte River target species and associated habitats, and provides ESA compliance[1] for effects to the target species and whooping crane critical habitat from such activities including avoidance of any prohibited take of such species [Program, I.A.2 & footnote 2.]. The State Wyoming is in compliance with their obligations under the Program.

For Federal actions and projects participating in the Program, the PRRIP Final Environmental Impact Statement (Final EIS) and the June 16, 2006 programmatic biological opinion (PBO) serve as the description of the environmental baseline and environmental consequences for the effects of the

1 "ESA Compliance" means: (1) serving as the reasonable and prudent alternative to offset the effects of water related activities that USFWS found were likely to cause jeopardy to one or more of the target species or to adversely modify critical habitat before the Program was in place; (2) providing offsetting measures to avoid the likelihood of jeopardy to one or more of the target species or adverse modification of critical habitat in the Platte River basin for new or existing water-related activities evaluated under the ESA after the Program was in place; and (3) avoiding any prohibited take of target species in the Platte River basin.

Proposed actions on the listed target species, whooping crane critical habitat, and other listed species in the central and lower Platte River addressed in the PBO. These documents are hereby incorporated into this Biological Assessment by this reference.

Table II-1 of the PBO (pages 21-23) contains a list of species and critical habitat in the action area, their status, and the USFWS's determination of the effects of the Federal Action analyzed in the PBO. The USFWS determined in the PBO that the continued operation of existing and certain new water-related activities could adversely affect but would not likely jeopardize the continued existence of the endangered whooping crane, interior population of the least tern, and pallid sturgeon, or the threatened northern Great Plains population of the piping plover. Further, the USFWS found that the continued operation of existing and certain new water-related activities could adversely affect but would not likely jeopardize the threatened western prairie fringed orchid associated with the central and lower reaches of the Platte River in Nebraska, and was not likely to adversely affect designated critical habitat for the whooping crane.

In Wyoming, the Project operations qualify as a "new water related activity" because the water use is assumed to be depletion without determination of specific water sources. A depletion constitutes a new surface water or hydrologically connected groundwater activities which could affect the quantity or timing of water reaching the associated habitats of the target species implemented after July 1, 1997 [Program, I.A. footnote 3]. The existing water related activity conforms to the criteria in Section III of Chapters 2 or 3 of the Depletions Plan, Platte River basin, Wyoming (Wyoming's Depletions Plan [Program, Attachment 5, Section 7]) and:

1. The existing water related activity is operated on behalf of Wyoming water users;
2. The State Coordinator will determine if the activity qualifies as an existing water related activity; and
3. If required by the State Coordinator, the Applicant will sign a Wyoming Recovery Agreement to document any mitigation requirements need to qualify as an existing water activity.

Accordingly, the impacts of this activity to the target species, whooping crane critical habitat, and other listed species in the central and lower Platte River addressed in the PBO are covered and offset by operation of Wyoming's Depletions Plan as part of the PRRIP.

TransWest intends to rely on the provisions of the Program to provide ESA compliance for potential impacts to the target species and whooping crane critical habitat. The BLM intends to require, as a condition of any approval, that TransWest fulfill the responsibilities required of Program participants in Wyoming. The BLM also intends to retain discretionary Federal authority for the Project, consistent with applicable regulations and Program provisions, in case re-initiation of Section 7 consultation is required.

In total, approximately 9.8 acre-feet of water would be used within the Platte River basin. Approximately 8 acre-feet of water would be used for construction within the refined transmission corridor. In addition, 1.8 acre-feet of water would be used for dust control during construction of the Northern Terminal (substation/converter station). The source of water would include municipal supplies, commercial sources, or a temporary water use agreement with landowners holding existing water rights. Since specific water sources have not been identified at this time, the USFWS cannot determine if the water sources have been through Section 7 consultation. Therefore, the USFWS assumes that all of the construction water use would be new depletions. This action would represent a consumptive water use from the Platte River basin of 9.8 acre-feet during a 3-year time frame when water would be used for construction purposes. This volume represents an average annual depletion of 3.3 acre-feet per year for the 3-year construction period. This small depletion would represent an adverse effect on the federally listed Platte River species and critical habitat for the whooping crane. The Platte River Recovery Implementation Program would be used to mitigate for the effects of water depletions on federally listed species in the Platte River. If the proposed water-related activity will deplete more than 0.1 acre-feet in

the Platte River system and will rely on surface water or hydrologically connected groundwater, an evaluation is required by the Wyoming State Engineer to determine whether the water use is a new or existing activity. If the activity is considered an existing water-related activity, the State Coordinator will determine whether any further action is required to be covered by the PRRIP. If further actions are required, a Wyoming Platte River Recovery Agreement will be executed between the water user and the Wyoming State Engineer.

The PRIP would be effective in minimizing effects of potential water depletions on least tern, piping plover, whooping crane and its critical habitat, pallid sturgeon, and western fringed orchid. However, if new water sources are used that have connections to surface flows in the North Platte Basin in Wyoming and they have not been previously consulted on by the USFWS, there could be a small net effect on these Platte River species. It is not possible to quantify the net effect other than relative terms, since water sources have not been identified at this time.

6.4.2.4 Cumulative Effects

No reasonably foreseeable non-federal future actions have been identified within the vicinity of the Project action area in Wyoming regarding water depletions. However, it is reasonable to expect that future water depletions could occur in the North Platte drainage and Platte River Basin as a result of non-federal actions such as agricultural or land development. The PRRIP was established to mitigate the effects of water depletions on federally endangered fish species in the Platte River Basin.

6.4.2.5 Determination

Effect on the Species: The Proposed Action *may affect, is likely to adversely affect* the interior population of the least tern, northern Great Plains population of the piping plover, whooping crane, pallid sturgeon, and western prairie fringed orchid as a result of potential water depletions. Construction and operation activities would not directly affect these species, since there is no occupied habitat within the corridor crossings.

Effect on Whooping Crane Critical Habitat: The Proposed Action *may affect, is likely to adversely affect* whooping crane critical habitat as a result of potential water depletions. Since there is no critical habitat in the Platte River system for the other target species, there would be no effect of potential water depletions on critical habitat for these species.

Rationale: Any water depletions in the North Platte and Platte River basins may affect the federally listed species in the Platte River system. However, the PRRIP would provide funds to assist in reducing the effects of flow reductions on the pallid sturgeon and other federally listed species in the Platte River system. The magnitude of the water depletion would depend on the selected water sources and whether they are connected to surface flows in the North Platte basin and if they have been consulted on previously.

7.0 References

Chapter 1.0

U.S. Fish and Wildlife Service and National Marine Fisheries Service (USFWS and NMFS). 1998. Endangered Species Consultation Handbook: Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act. March 1998.

Chapter 2.0

American Association of State Highway and Transportation Officials (AASHTO). 2006. "The Gold Book – Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development" AASHTO, 4th Edition, 2006.

American National Standards Institute, Inc. (ANSI). 2006. ANSI, A300 (Part 7) - 2006. Tree, Shrub, and Other Woody Plant Maintenance – Standard Practices (Integrated Vegetation Management a. Electric Utility Rights-of-way). Washington, D.C. February 2006.

Miller, R. 2007. International Society of Arboriculture's Best Management Practices: Integrated Vegetation Management.

North American Electric Reliability Corporation (NERC). 2009. Transmission Vegetation Management NERC Standard FAC-003-2 Technical Reference. Princeton, New Jersey. September 2009.

Western Area Power Administration (Western). 2007. Power System Maintenance Manual, Chapter 13 Maintenance Program. May 2007.

Chapter 3.0

Avian Power Line Interaction Committee (APLIC). 2012. *Reducing Avian Collisions with Power Lines: The State of the Art in 2012*. Edison Electric Institute and APLIC. Washington, D.C.

Avian Power Line Interaction Committee (APLIC). 2006. *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006*. Edison Electric Institute, APLIC, and the California Energy Commission. Washington, D.C., and Sacramento, California.

Bureau of Land Management (BLM). 2012. BLM Ely District Recommended Bird Nest Buffer Sizes. Unpublished internal guidance document provided by the Caliente Field Office. 4pp. October 12, 2012.

Bureau of Land Management (BLM). 2007. Final Programmatic Environmental Impact Statement Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States. BLM Nevada State Office. June 29, 2007.

National Marine Fisheries Service (NMFS). 1997. Fish Screening Criteria for Anadromous Salmonids. National Marine Fisheries Service, Southwest Region.

Chapter 4.0

AECOM. 2012. Raptor Nest Data Aerial Raptor Nest Survey. April 2012.

Chapter 5.0

Avian Power Line Interaction Committee (APLIC). 1994. *Mitigating Bird Collisions with Power Lines: The State of the Art in 1994*. Edison Electric Institute. Washington, D.C. 78 pp.

Bevanger, K.. 1998. Biological and Conservation Aspects of Bird Mortality Caused by Electricity Power Lines: A Review. Biological Conservation 86(1998):67-76.

Bevanger, K. 1994. Bird Interactions with Utility Structures: Collision and Electrocution, Causes and Mitigating Measures. IBIS 136:412-425.

Bevanger, K. 1990 Topographic Aspects of Transmission Wire Collision Hazards to Game Birds in the Central Norwegian Coniferous Forest. The California Energy Commission. Internet website: www.energy.ca.gov.

Binkley, D., S. Bird, M. G. Ryan, and C. C. Rhoades. 2003. Impact of Wood Chips on Forest Soil Temperature, Moisture, and Nitrogen Supply. Unpublished report to the Interior West Center for the Innovative Use of Small Diameter Wood. Fort Collins, Colorado.

Blomberg, E., D. Nonne, and J. Sedinger. 2010. Dynamics of Greater Sage-grouse (*Centrocercus urophasianus*) Populations in Response to Transmission Lines in Central Nevada. Progress Report: Year 8, December 2010. Department of Natural Resources and Environmental Sciences. University of Nevada – Reno.

Bramble, W. C. and W. R. Byrnes. 1996. Integrated Vegetation Management of an Electric Utility Right-of-way Ecosystem. Down to Earth 51(2):29-34.

Brown, W. M. and R. C. Drewien. 1995. Evaluation of Two Power Line Markers to Reduce Crane and Waterfowl Collision Mortality. Wildlife Society Bulletin 23(2):217-227. Published by: Allen Press. Internet website: http://www.jstor.org/stable/3782794. Accessed November 29, 2012.

Burke, M. J. W. and J. P. Grime. 1996. An Experimental Study of Plant Community Invisibility. Ecology 77:776-790.

Cole, E. K., M. D. Pope, and R. G. Anthony. 1997. Effects of Road Management on Movement and Survival of Roosevelt Elk. The Journal of Wildlife Management 61(4):1115-1126.

D'Antonio, C., J. Levine, and M. Thomsen. 2001. Ecosystem Resistance to Invasion and the Role of Propagule Supply: A California Perspective. Journal of Mediterranean Ecology 2:233-245.

Erickson, W. P., G. D. Johnson, and D. P. Young. 2005. A Summary and Comparison of Bird Mortality from Anthropogenic Causes with an Emphasis on Collisions. USDA Forest Service General Technical Report PSW-GTR-191. Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture. Albany, California. Pages 1029-1042.

Faanes, C. A. 1987. Bird Behavior and Mortality in Relation to Power Lines in Prairie Habitats. U.S. Fish and Wildlife Service General Technical Report 7. Washington, D.C. 24 pp.

Folke, C., S. Carpenter, B. Walker, M. Scheffer, T. Elmqvist, L. Gunderson, and C. S. Holling. 2004. Regime shifts, resilience, and biodiversity in ecosystem management. Annual Review of Ecology, Evolution, and Systematics 35:557-581.

Forman, R. T. T., D. Sperling, J. A. Bissonette, A. P. Clevenger, C. D. Cutshall, V. H. Dale, L. Fahrig, R. France, C. R. Goldman, K. Heanue, J. A. Jones, F. J. Swanson, T. Turrentine, and T. C. Winter. 2003. Road Ecology, Science and Solutions.

Gehring, J., P. Kerlinger, and A. M. Manville, II. 2009. Communication Towers, Lights, and Birds: Successful Methods of Reducing the Frequency of Avian Collisions. Ecological Applications 19(2):505-514.

Gelbard, J. L. and J. Belnap. 2003. Roads as Conduits for Exotic Plant Invasions in a Semiarid Landscape. Conservation Biology 17(2):420-432.

Holbrook, H. T. and M. R. Vaughan. 1985. Influence of Roads on Turkey Mortality. The Journal of Wildlife Management 49(3):611-614.

Irwin, L. L. and J. M. Peek. 1983. The Journal of Wildlife Management 47(3):664-672.

Knight, R. L. and J. Y. Kawashima. 1993. Responses of Raven and Red-tailed Hawk Populations to Linear Right-of-ways. The Journal of Wildlife Management 57(2):266-271.

LaGory, K. E., Chang, Young-Soo, K. C. Chun, T. Reeves, R. Liebich, and K. Smith 2001. A Study of the Effects of Gas Well Compressor Noise on Breeding Bird Populations of the Rattlesnake Canyon Habitat Management Area, San Juan County, New Mexico. Prepared by: Argonne National Laboratory, Environmental Assessment Division for U.S. Department of Energy Assistant Secretary for Fossil Energy. Work Performed under Contract W-31-109-Eng-38. Report DOE/BC/W-31-109-Eng-10.

Loehman, R. A., J. A. Clark, and R. E. Keane. 2011. Modeling effects of climate change and fire management on western white pine (*Pinus monticola*) in the Northern Rocky Mountains, USA. Forests 2:832-860.

Lyon, L. J. 1983. Road Density Models Describing Habitat Effectiveness for Elk. Journal of Forestry. September 1983.

Lyon, L. J. 1979. Habitat Effectiveness for Elk as Influenced by Roads and Cover. Journal of Forestry. October 1979.

Manville, A. M., III. 2009. Towers, Turbines, Power Lines, and Buildings – Steps being Taken by the U.S. Fish and Wildlife Service to Avoid or Minimize Take of Migratory Birds at these Structures. Proceedings of the Fourth International Partners in Flight Conference: Tundra to Tropics 262-272.

Manville, A. M., III. 2005. Bird Strikes and Electrocutions at Power Lines, Communication Towers, and Wind Turbines: State of the Art and State of the Science – Next Steps toward Mitigation. USDA Forest Service General Technical Report PSW-GTR-191. 14 pp.

Manville, A. M., III. 2002. Bird Strikes and Electrocutions at Power Lines, Communication Towers, and Wind Turbines: State of the Art and State of the Science – Next Steps Toward Mitigation. U.S. Department of Agriculture Forest Service General Technical Report Rep. PSW-GTR-191.

Nonne, D., E. Blomberg, and J. Sedinger. 2011. Dynamics of Greater Sage-grouse (*Centrocercus urophasianus*) Populations in Response to Transmission Lines in Central Nevada. Progress Report: Year 9, December 2011. Department of Natural Resources and Environmental Sciences. University of Nevada – Reno.

Reijnen, R., R. Foppen, and G. Veenbaas. 1997. Disturbance by Traffic of Breeding Birds: Evaluation of the Effect and Considerations in Planning and Managing Road Corridors. Biodiversity and Conservation 6(1997):567-581.

Reijnen, R., R. Foppen, and H. Neeuwsen. 1996. The Effects of Traffic on the Density of Breeding Birds in Agricultural Grasslands. Biological Conservation 75(1996):255-260.

Reijnen, R. R. Foppen, C. Ter Braak, and J. Thissen. 1995. The Effects of Car Traffic on Breeding Bird Populations in Woodland. III. Reduction of Density in Relation to the Proximity of Main Roads. Journal of Applied Ecology 32(1995):187-202.

Rost, G. R. and J. A. Bailey. 1979. Distribution of Mule Deer and Elk in Relation to Roads. The Journal of Wildlife Management 43(3):634-641.

Savereno, A. J., L. A. Savereno, R. Boettcher, and S. M. Haig. 1996. Avian Behavior and Mortality at Power Lines in Coastal South Carolina. Wildlife Society Bulletin 24(4):636-648.

Sawyer, H., R. M. Nielson, F. Lindzey, and L. L. McDonald. 2006. Winter Habitat Selection of Mule Deer Before and During Development of a Natural Gas Field. The Journal of Wildlife Management 70(2):396-403.

Science Applications International Corporation (SAIC). 2001. An Assessment of Sage-grouse and Sharp-tailed Grouse Habitat in Transmission Line Corridors Associated with the Hells Canyon Hydroelectric Complex. Technical Report.

Steenhof, K., M. N. Kochert, and J. A. Roppe. 1993. Nesting by Raptors and Common Ravens on Electrical Transmission Line Towers. Journal of Wildlife Management 57(2):271-281. Internet website: http://www.jstor.org/stable/3809424. Accessed November 28, 2012.

Stohlgren T. J., D. Binkley, G. W. Chong, M. A. Kalkhan, L. D. Schell, K. A. Bull, Y. Otsuki, G. Newman, M. Bashkin, and Y. Son. 1999. Exotic Plant Species Invade Hot Spots of Native Plant Diversity. Ecological Monographs 69(1):25-46.

Stohlgren, T. J., D. T. Barnett, and J. T. Kartesz. 2003. The Rich Get Richer: Patterns of Plant Invasions in the United States. Frontiers in Ecology and the Environment 1(1):11-14.

Trombulak, S. C. and C. A. Frissell. 2000. Review of Ecological Effects of Roads on Terrestrial and Aquatic Communities. Conservation Biology 14(1):18-30.

U.S. Fish and Wildlife Service (USFWS). 2013a. Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for the Contiguous U.S. Distinct Population Segment of the Canada Lynx and Revised Distinct Population Segment Boundary, Proposed Rule. 78 FR 59429.

Utah Division of Wildlife Resources (UDWR). 2009. Utah Greater Sage-grouse Management Plan. Utah Department of Natural Resources, Division of Wildlife Resources, Publication 09-17, Salt Lake City, Utah.

Watkins, R. Z., J. Chen, J. Pickens, and K. D. Brosofske. 2003. Effects of Forest Roads on Understory Plants in a Managed Hardwood Landscape. Conservation Biology 17(2):411-419.

Waters, T. F.1995. Sediment in Streams. Sources, Biological Effects and Control. American Fisheries Society Monograph 7. 251 pp.

Wyoming Game and Fish Department (WGFD). 2010. State Wildlife Action Plan – 2010.

Chapter 6.0

AECOM. 2014a. Utah Prairie Dog Survey Report for the TransWest Express Transmission Project. Prepared for the Bureau of Land Management and Western Area Power Administration.

AECOM. 2014b. Mojave Desert Tortoise Survey Report for the TransWest Express Transmission Project . Prepared for the Bureau of Land Management and Western Area Power Administration. 154 pp.

Allen, J. A. 1874. Notes on the Mammals of Portions of Kansas, Colorado, Wyoming, and Utah. Bulletin of Essex Institute 6:43-66.

American Ornithologists' Union (AOU). 2004. The AOU Check-list of North American Birds. 7th Edition. American Ornithologists' Union, Washington, D.C. 829 pp.

Andersen, M. E., C. J. Keleher, J. E. Rasmussen, E. S. Hansen, P. D. Thompson, D. W. Speas, M. D. Routledge, and T. N. Hedrick. 2006. Status of June Sucker in Utah Lake and Refuges. American Fisheries Society Symposium 53:43-62.

Anderson, B. W. and R. D. Ohmart. 1985. Habitat Use by Clapper Rails in the Lower Colorado River Valley. The Condor 87(1):116-126.

Anderson, E., S. C. Forrest, T.W. Clark, and L. Richardson. 1986. Paleobiology, Biogeography, and Systematics of the Black-footed Ferret, *Mustela nigripes* (Audubon and Bachman), 1851. Great Basin Naturalist Memoirs 8:11-62.

Arizona Game and Fish Department (AGFD). 2012. California Condor Recovery. Internet site: http://www.azgfd.gov/w_c/california_condor.shtml. Accessed January 1, 2014.

Arizona Game and Fish Department (AGFD). 2008. California Condor Recovery. Internet site: http://www.azgfd.gov/w_c/california_condor.shtml .Accessed January 29, 2010.

Arizona Game and Fish Department (AGFD). 2006. Yuma Clapper Rail. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, Arizona. 11 pp.

Armstrong, D. M., J. P. Fitzgerald, and C. A. Meany. 2011. Mammals of Colorado. 2nd Edition. The University Press of Colorado. Boulder, Colorado. 620 pp.

Beck, J. L. and D. L. Mitchell. 1997. Brief Guidelines for Maintaining and Enhancing Sage-grouse Habitat on Private Lands in Utah. Utah Technical Notes: UT190-7-3. US Natural Resources Conservation Service, Salt Lake City, Utah. As cited in Utah Division of Wildlife Resources. 2001. Distribution and Status of Sage-grouse in Utah. 10 pp.

Beck, J. L., K. P. Reese, J. W. Connelly, and M. B. Lucia. 2006. Movements and Survival of Juvenile Greater Sage-grouse in Southeastern Idaho. Wildlife Society Bulletin 34:1070-1078.

Bennett, J. and D. A. Keinath. 2003. Species Assessment for Yellow-billed Cuckoo (*Coccyzus americanus*) in Wyoming. Prepared for the U.S. Department of the Interior, Bureau of Land Management. Cheyenne, Wyoming. 43 pp.

Berry, K. H. and P. Medica. 1995. Desert Tortoises in the Mojave and Colorado Deserts. Pages 135-137 In: Our Living Resources: A Report to the Nation on the Distribution, Abundance, and Health of U.S. Plants, Animals, and Ecosystems, E. T. LaRoe, G. S. Farris, C. E. Puckett, P. D. Doran, and M. J. Mac, Editors. U.S. Department of the Interior, Washington, D.C.

Berry, K. H., T. Shields, A. P. Woodman, T. Campbell, J. Roberson, K. Bohuski, and A. Karl. 1986. Changes in Desert Tortoise Populations at the Desert Tortoise Research Natural Area between 1979 and 1985. Proceedings of the Symposium, Desert Tortoise Council 1986:100-123.

Bestgen, K. R., J. A. Hawkins, G. C. White, C. D. Walford, P. Badame, and L. Monroe. 2010. Population Status of Colorado Pikeminnow in the Green River Basin, Utah and Colorado, 2006-2008. Final Report. Colorado River Recovery Implementation Program Project Number 128, Larval Fish Laboratory Contribution 161, 112 pp.

Biggins, D. E, J. M. Lockhart, and J. L. Godbey. 2006. Evaluating Habitat for Black-footed Ferrets: Revision of an Existing Model. U.S. Geological Survey. 9 pp.

Bi-State Local Planning Group (Bi-State Plan). 2004. Greater Sage-grouse Conservation Plan for the Bi-State Plan Area of Nevada and Eastern California. First Edition. Bi-State Local Planning Group. June 2004.

Blickley, J. L., D. Blackwood, and G. L. Patricelli. 2012. Experimental Evidence for the Effects of Chronic Anthropogenic Noise on Abundance of Greater Sage-Grouse at Leks. Society for Conservation Biology 26(3):461–471.

Blomberg E., D. Nonne, and J. Sedinger. 2010. Dynamics of Greater Sage-grouse (*Centrocercus urophasianus*) Populations in Response to Transmission Lines in Central Nevada. Progress Report: Year 8. December 2010. Department of Natural Resources and Environmental Sciences, University of Nevada, Reno. 61 pp.

Boarman, W. I. 2003. Managing a Subsidized Predator Population: Reducing Common Raven Predation on Desert Tortoises. Environmental Management 32(2):205-217.

Braun, C. E. 1998. Sage-grouse Declines in Western North America: What Are the Problems? Proceedings of the Western Association of State Fish and Wildlife Agencies 78:139-156.

Braun, C. E. 1995. Distribution and status of Sage Grouse in Colorado. Prairie Naturalist 27:1-9.

Brown, W. M. and R. C. Drewien. 1995. Evaluation of Two Power Line Markers to Reduce Crane and Waterfowl Collision Mortality. Wildlife Society Bulletin 23(2):217-227. Published by: Allen Press. Internet website: http://www.jstor.org/stable/3782794. Accessed November 29, 2012.

Bunnell, K. D. 2000. Ecological Factors Limiting Sage Grouse Recovery and Expansion in Strawberry Valley, Utah. Thesis. Brigham Young University, Provo, Utah.

Bureau of Land Management (BLM). 2013. Northwest Colorado Greater Sage-grouse Draft Land Use Plan Amendment and Environmental Impact Statement. U.S. Department of the Interior (BLM) and U.S. Department of Agriculture (USFS). August 2013.

Bureau of Reclamation (BOR) and U.S. Fish and Wildlife Service (USFWS). 2006. Platte River Recovery Implementation Program – Final. October 24, 2006.

Canadian Wildlife Service (CWS) and U.S. Fish and Wildlife Service (USFWS). 2007. International Recovery Plan for the Whooping Crane. Ottawa: Recovery of Nationally Endangered Wildlife (RENEW), and U.S. Fish and Wildlife Service, Albuquerque, New Mexico. 162 pp.

Cary, M. 1911. A Biological Survey of Colorado. North American Fauna 33:1-256.

Christiansen, T . 2010. Hunting and Sage-Grouse: A Technical Review of Harvest Management On a Species of Concern in Wyoming . Wyoming Game and Fish Department. 19 pp.

Coates, P. S., K. B. Howe, M. L. Casazza, and D. J. Delehanty. 2014. Common Raven Occurrence in Relation to Energy Transmission Line Corridors Transiting Human-altered Sagebrush Steppe. Journal of Arid Environments 111(2014):68-78.

Collier, G. D. 1975. The Utah Prairie Dog: Abundance, Distribution, and Habitat Requirements. Publication No. 75-10. Published by the State of Utah Division of Wildlife Resources. 108 pp.

Colorado Greater Sage-grouse Steering Committee (CGSSC). 2008. Colorado Greater Sage-grouse Conservation Plan. Colorado Division of Wildlife. Denver, Colorado, USA. 711 pp.

Connelly, J. W., C. A. Hagen, and M. A. Schroeder. 2011. Characteristics and Dynamics of Greater Sage-grouse Populations. Pp. 53–67 *in* S. T. Knick and J. W. Connelly (editors). Greater Sage-grouse: Ecology and Conservation of a Landscape Species and its Habitats. Studies in Avian Biology 38:53-67. University of California Press, Berkeley, California.

Connelly, J. W., S. T. Knick, M. A. Schroeder, and S. J. Stiver. 2004. Conservation Assessment of Greater Sage-grouse and Sagebrush Habitats. Western Association of Fish and Wildlife Agencies. Unpublished Report. Cheyenne, Wyoming.

Connelly, J. W., M. A. Schroeder, A. R. Sands, and C. E. Braun. 2000. Guidelines to Manage Sage-grouse Populations and their Habitats. Wildlife Society Bulletin 28(4):967-985.

Corman, T. E and C. Wise-Gervais, Editors. 2005. Arizona Breeding Bird Atlas. Yellow-billed Cuckoo. University of New Mexico Press, Albuquerque.

Corn, P. S. 1994. Recent Trends of Desert Tortoise Populations in the Mojave Desert. Pages 85-94 In: Biology of North American Tortoises, R. B. Bury and D. J. Germano, Editors. Fish and Wildlife Research Publication #13.

Crawford, R. L. and H. M. Stevenson. 1984. Patterns of Spring and Fall Migration in Northwest Florida. Journal of Field Ornithology 55:196-203.

Crawford, J. A., R. A. Olson, N. E. West, J. C. Mosley, M. A. Schroeder, T. D. Whitson, R. F. Miller, M. A. Gregg, and C. S. Boyd. 2004. Ecology and Management of Sage-grouse and Sage-grouse Habitat. Journal of Range Management 57(1):2-19.

Cross, J. N. 1976. Status of the Native Fish Fauna of the Moapa River (Clark County, Nevada). Transactions of the American Fisheries Society 105(4):503-508.

Danks, Z. D. and W. F. Porter. 2010. Temporal, Spatial, and Landscape Habitat Characteristics of Moose-vehicle Collisions in Western Maine. Journal of Wildlife Management 74:1229–1241.

Defreese, A. 2014. Utah Field Office, U.S. Fish and Wildlife Service, Personal communication to R. Daggett, AECOM, Fort Collins, Colorado. March 19, 2014.

Desholm, M. and J. Kahlert. 2005. Avian Collision Risk at an Offshore Wind Farm. Biology Letters 1(3):296-298.

Dixon, A., G. Purev-Ochir, B. Galtbalt, and N. Batbayar. 2013. The Use of Power Lines by Breeding Raptors and Corvids in Mongolia: Nest-Site Characteristics and Management Using Artificial Nests. Journal of Raptor Research 47(3):282-291.

Dunford, R. W., T. C. Ginn, and W. H. Desvousges. 2004. The Use of Habitat Equivalency Analysis in Natural Resource Damage Assessments. Ecological Economics 48(2004):49–70.

Ellis, K. L. 1985. Effects of a New Transmission Line on Distribution and Aerial Predation of Breeding Male Sage-grouse. Final Report for Deseret Generation and Transmission Cooperative. Sandy, Utah.

Emslie, S. D. 1987. Age and Diet of Fossil California Condors in Grand Canyon, Arizona. Science 237:768-770.

Ernst, C. H. and J. E. Lovich. 2009. Turtles of the United States and Canada. Second Edition. John Hopkins University Press. Baltimore, Maryland. 827 pp.

Esch, K. L., G. P. Beauvis, and D. A. Keinath. 2005. Species Conservation Assessment for Black-footed Ferret (*Mustela nigripes*) in Wyoming. Prepared for the U.S. Department of the Interior, Bureau of Land Management Wyoming State Office, Cheyenne, Wyoming. 50 pp.

Esque, T. C. and E. L. Peters. 1994. Ingestion of Bones, Stones, and Soil by Desert Tortoises. Pages 105-111 In: Biology of North American Tortoises. R. B. Bury and D. J. Germano, editors. U.S. Department of the Interior. Fish and Wildlife Research Publication 13.

Fernie, K. J. and S. J. Reynolds. 2005. The Effects of Electromagnetic Fields from Power Lines on Avian Reproductive Biology and Physiology: A Review. Journal of Toxicology and Environmental Health, Part B(8):127-140.

Fertig, W. 2000. Status Review of Ute Ladies'-tresses (*Spiranthes diluvialis*) in Wyoming. Prepared for the Wyoming Cooperative Fish and Wildlife Research Unit, U.S. Fish and Wildlife Service, and Wyoming Game and Fish Department. January 4, 2000.

Fertig, W., R. Black, and P. Wolken. 2005. Rangewide Status Review of Ute Ladies'-tresses (*Spiranthes diluvialis*). Prepared for the U.S. Fish and Wildlife Service and Central Utah Water Conservancy District. 30 September 2005. Internet website: http://www.fws.gov/mountain-prairie/species/plants/uteladiestress/SPDI_Status%20review_Fertig2005.pdf. Accessed May 2014.

Fleischer, R. C., G. Fuller, and D. B. Ledig. 1995 . Genetic Structure of Endangered Clapper Rail (*Rallus longirostris*) Populations in Southern California. Conservation Biology 9:1234-1242.

Floyd T., C. S. Elphick, G. Chisholm, K. Mack, R.G. Elston, E. M. Ammon, and J. D. Boone. 2007. Atlas of the Breeding Birds of Nevada. 581 pp.

Franklin, M. A. "Ben". 1990. Report for 1990 Challenge Cost Share Project Manti-La Sal National Forest. Target Species: *Astragalus desereticus* Barneby (Deseret milkvetch). Utah Natural Heritage Program, Utah Department of Natural Resources. 5 pp.+ appendices.

Gehring, J., P. Kerlinger, and A. M. Manville, II. 2011. The Role of Tower Height and Guy Wires on Avian Collisions with Communication Towers. Journal of Wildlife Management 75(4):848-855.

Germano, D. J., R. B. Bury, T. C. Esque, T. H. Fritts, and P. A. Medica. 1994. Range and Habitats of the Desert Tortoise. Fish and Wildlife Research 13.

Gibson, R. M. and G. C. Bachman. 1992. The Costs of Female Choice in a Lekking Bird. Behavioral Ecology 3(4):300-309.

Gibson, D., E. Blomberg, and J. Sedinger. 2013. Dynamics of Greater Sage-grouse (*Centrocercus urophasianus*) Populations in Response to Transmission Lines in Central Nevada. Progress Report: Final. Department of Natural Resources and Environmental Sciences, University of Nevada – Nevada. December 2013.

Great Basin Bird Observatory (GBBO). 2010. Clapper Rail (*Rallus longirostris*). Nevada Comprehensive Bird Conservation Plan. Version 1.0. Internet website: http://www.gbbo.org/bird_conservation_plan.html.

Haig, S. M. and J. H. Plissner. 1993. Distribution and Abundance of Piping Plovers: Results and Implications of the 1991 International Census. The Condor 95(1):145-156. Internet website: http://www.jstor.org/stable/1369396 Accessed: November 29, 2012.

Harrison, E. N., and L. F. Kiff. 1980. Apparent Replacement Clutch Laid by Wild California Condor. Condor 82:351-352.

Hartzler, J. E. 1974. Predation and the Daily Timing of Sage-Grouse Leks. The Auk 91:532-536.

Hiatt, H. and J. Boone. 2003. Clark County, Nevada: Species Account Manual. Department of Comprehensive Planning, Clark County, Nevada. 222 pp.

Hillman, C. N. and T. W. Clark. 1980. *Mustela nigripes*. Mammalian Species No.126:1-3.

Holloran, M. J. 2005. Greater Sage-grouse (*Centrocercus urophasianus*) Population Response to Natural Gas Field Development in Western Wyoming. Ph.D. Dissertation. University of Wyoming, Laramie. 223 pp.

Hoogland, J. L. 2001. Black-tailed, Gunnison's, and Utah Prairie Dogs Reproduce Slowly. Journal of Mammalogy 82(4):917-927. Internet website: http://www.jstor.org/stable/1383470. Accessed December 12, 2013.

Howe, K. B., P. S. Coates, and D.J. Delehenty. 2014. Selection of Anthropogenic Features and Vegetation Characteristics by Nesting Common Ravens in the Sagebrush Ecosystem. The Condor 116(1):35-49. doi: 10.1650/CONDOR-13-115-R2.1.

Hughes, J. M. 1999. Yellow-billed Cuckoo (*Coccyzus americanus*), The Birds of North America Online (A. Poole, Editor). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online. Internet website: http://bna.birds.cornell.edu/bna/species/418.

Interagency Lynx Biology Team. 2013. Canada Lynx Conservation Assessment and Strategy. 3rd edition. USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, and USDI National Park Service. Forest Service Publication R1-13-19, Missoula, Montana. 128 pp.

Irving, D. and T. Modde. 2000. Home-range Fidelity and Use of Historical Habitat by Adult Colorado Squawfish (*Ptychocheilus lucius*) in the White River, Colorado, and Utah. Western North American Naturalist 60:16–25.

International Union for Conservation of Nature and Natural Resources (IUCN). 2013 The IUCN Red List of Threatened Species. Internet website: http://www.iucnredlist.org. Accessed July 30, 2014.

Jenni, D. A. and J. E. Hartzler. 1978. Attendance at a Sage-grouse Lek: Implications for Spring Censuses. Journal of Wildlife Management 42(1):46-52.

Jennings, W. B. 1997. Habitat Use and Food Preferences of the Desert Tortoise, *Gopherus agassizii*, in the Western Mojave Desert and Impacts of Off-road Vehicles. Proceedings: Conservation, Restoration, and Management of Tortoises and Turtles – An International Conference. Pages 42-45. New York Turtle and Tortoise Society.

Johnson, W. C. and S. K. Collinge. 2004. Landscape Effects on Black-tailed Prairie Dog Colonies. Biological Conservation 115 (2004) 487–497.

Johnson. M. J., S. L. Durst, C. M. Calvo, L. Stewart, M. K. Sogge, G. Bland, and T. Arundel. 2008 . Yellow-Billed Cuckoo Distribution, Abundance, and Habitat Use Along the Lower Colorado River and its Tributaries, 2007 Annual Report. U.S. Department of the Interior, U.S. Geologic Survey, Virginia. 284 pp.

June Sucker Recovery Implementation Program. 2012. Internet website: http://www.junesuckerrecovery.org. Accessed April 16, 2014.

Kaeding, L. R., B. D. Burdick, P. A. Schrader, and W. R. Noonan. 1986. Recent Capture of a Bonytail (*Gila elegans*) and Observations on the Nearly Extinct Cyprinid from the Colorado River. Copei 1986:1021-1023.

Keenlyne, K. D. and L. G. Jenkins. 1993. Age at Sexual Maturity of the Pallid Sturgeon. Transactions of the American Fisheries Society 122:393-396.

King, D. M. 1997. Paper #1: Comparing Ecosystem Services and Values. With Illustrations for Performing Habitat Equivalency Analysis. Prepared for U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Damage Assessment and Restoration Program. Silver Spring, Maryland.

Kingery, H. E., Editor. 1998. Colorado Breeding Bird Atlas. Colorado Bird Atlas Partnership and the Colorado Division of Wildlife. Denver, Colorado. 636 pp.

Klebenow, D. A. 1985. Habitat Management of Sage-grouse in Nevada. World Pheasant Association Journal 10:34-36.

Klebenow, D. A. 1982. Livestock Grazing Interactions with Sage grouse. Pages 113-123 In: J. M. Peek and P. D. Dalke, Editors. Proceedings of the Wildlife-Livestock Relationships Symposium, 20-22 April 1981. Couer d'Alene, Idaho. Proceeding 10, University of Idaho Forestry, Wildlife, and Range Experiment Station, Moscow, USA.

Knick, S. T. and J. W. Connelly, Editors. 2011. Greater Sage-grouse: Ecology and Conservation of a Landscape Species and its Habitats. Studies in Avian Biology 38. University of California Press, Berkeley, California.

Knick, S. T. and S. E. Hanser. 2011. Connecting Pattern and Process in Greater sage-grouse Populations and Sagebrush Landscapes. Internet website: http://sagemap.wr.usgs.gov/monograph.aspx. Accessed March 30, 2015.

Knick, S. T., S. E. Hanser, and K. L. Preston. 2013. Modeling Ecological Minimum Requirements for Distribution of Greater Sage-grouse Leks: Implications for Population Connectivity Across Their Western Range, USA. Ecology and Evolution 3(6):1539-1551.

Kochert, M. N., K. Steenhof, C. L. McIntyre, and E. H. Craig. 2002. Golden Eagle (*Aquila chrysaetos*). In: The Birds of North America, No. 684 (A. Poole and F. Gill, editors). The Birds of North America Online, Ithaca, New York.

Kohler, K. E. and R. E. Dodge . 2006. Visual_HEA: Habitat Equivalency Analysis Software to Calculate Compensatory Restoration Following Natural Resource Injury. Proceedings of 10th International Coral Reef Symposium, 1611-1616.

Kolada E. J., M. L. Casazza, and J. S. Sedinger. 2009. Ecological Factors Influencing Nest Survival of Greater Sage-grouse in Mono County, California. Journal of Wildlife Management 73(8):1341-1347.

Lammers W. M. and M. W. Collopy. 2007. Effectiveness of Avian Predator Perch Deterrents on Electric Transmission Lines. Journal of Wildlife Management. 71(8):2752-2758.

LeBeau, C. W., J. L. Beck, G. D. Johnson, R. M. Nielson, and M. J. Holloran . 2012. Evaluation of Greater Sage-grouse Reproductive Habitat and Response to Wind Energy Development in South-central Wyoming . University of Wyoming, WEST Inc., and Wyoming Wildlife Consultants, LLC.

Leu, M., S. E. Hanser, and S. T. Knick. 2008. The Human Footprint in the West: A Large-scale Analysis of Anthropogenic Impacts. Ecological Applications 18(5):1119-1139.

Longridge, M. W. 1986. The Environmental Impact of Transmission Lines on Bird Flight Behaviour, with Reference to Collision Mortality and Systems Reliability. Bird Research Community, ESCOM, Johannesburg. Pages 1-279.

Luckenbach, R. A. 1982. Ecology and Management of the Desert Tortoise (*Gopherus agassizii*) in California. Pages 1-37 In: R. B. Bury, Editor. 1982. North American Tortoise Conservation and Ecology. Wildlife Research Report 12. U.S. Fish and Wildlife Service. Washington, D.C.

Lyon, A. G. and S. H. Anderson. 2003. Potential Gas Development Impacts on Sage-grouse Nest Initiation and Movement. Wildlife Society Bulletin 31(2):486-491.

Maddux, H. R., L. A. Fitzpatrick, and W. R. Noonan. 1993. Colorado River Endangered Fishes Critical Habitat. Draft Biological Support Document. U.S. Fish and Wildlife Service. Salt Lake City, Utah.

Marshall, R. M. 2000. Population Status on Breeding Grounds. Chapter 2 In: Status, Ecology, and Conservation of the Southwestern Willow Flycatcher. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. General Technical Report RMRS-GTR-60. Albuquerque, New Mexico.

Meisingset, E. L., L. E. Loe, O. Brekkum, and A. Mysterud. 2014. Targeting Mitigation Efforts: The Role of Speed Limit and Road Edge Clearance for Deer-vehicle Collisions. The Journal of Wildlife Management 78(4):679-688.

Miller, B., R. P. Reading, and S. Forrest. 1996. Prairie Night: Black-footed Ferrets and the Recovery of Endangered Species. Smithsonian Institution Press. Washington, D.C., USA.

Mowat, G., K. G. Poole, and M. O'Donoghue. 2000. Ecology of Lynx in Northern Canada and Alaska. Chapter 9 In: L. F. Ruggiero, K. B. Aubry, and S. W. Buskirk, G. M. Krebs, K. S. McKelvey, and J. R. Squires, Editors. In: Ecology and Conservation of Lynx in the United States. General Technical Report RMRS-GTR-30WWW. University Press of Colorado, Boulder. 480 pp.

National Oceanic and Atmospheric Administration (NOAA). 2009. Coastal Services Center. Environmental Economics - Habitat Equivalency Analysis. Coastal Ecosystem Restoration.

National Oceanic and Atmospheric Administration (NOAA). 2006. Habitat Equivalency Analysis: An Overview. Damage Assessment and Restoration Program, National Oceanic and Atmospheric Administration. Department of Commerce.

NatureServe. 2014. NatureServe Explorer: An Online Encyclopedia of Life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Internet website: http://www.natureserve.org/explorer . Accessed April to May 2014.

NatureServe 2013a. *Gila elegans*. In: IUNC 2013. IUNC Red List of Threatened Species. Version 2013.2. Internet website: www.iuncredlist.org. Accessed May 29, 2014.

NatureServe 2013b. *Chasmistes liorus*. In: IUNC 2013. IUNC Red List of Threatened Species. Version 2013.2. Internet website: www.iuncredlist.org. Accessed May 29, 2014.

NatureServe 2013c. *Xyrauchen texanus*. In: IUNC 2013. IUNC Red List of Threatened Species. Version 2013.2. Internet website: www.iuncredlist.org. Accessed May 29, 2014.

NatureServe. 2013d. IUNC Red List. *Gila seminuda* (Virgin River Chub). Internet website: http://www.iucnredlist.org/details/full/202109/0. Accessed December 26, 2013.

NatureServe. 2013e. NatureServe Explorer: *Gopherus agassizii*. In: An Online Encyclopedia of Life [Web Application]. Version 7.1. NatureServe, Arlington, Virginia. Internet website: http://www.natureserve.org/explorer. Accessed November 14, 2013.

NatureServe. 2012. NatureServe Webservice. Comprehensive Report Species – *Coccyzus americanus occidentalis* . Arlington, Virginia. U.S.A. Internet Website http://services.natureserve.org

Neumann, W., G. Ericsson, H. Dettki, N. Bunnefeld, N. S. Keuler, D. P. Helmers, and V. C. Radeloff. 2012. Difference in Spatiotemporal Patterns of Wildlife Road-crossings and Wildlife-vehicle Collisions. Biological Conservation 145(2012)70-78.

Nonne, D., E. Blomberg, and J. Sedinger. 2013. Dynamics of Greater Sage-grouse (*Centrocercus urophasianus*) Populations in Response to Transmission Lines in Central Nevada. Progress Report: Year 10. February 2013.

Oakleaf, R. J. 1971. The Relationship of Sage-grouse to Upland Meadows in Nevada. Thesis, University of Nevada, Reno, USA.

O'Connor, M. P., L. C. Zimmerman, D. E. Ruby, S. J. Bulova, and J. R. Spotila. 1994. Home Range Size and Movements by Desert Tortoises, *Gopherus agassizii*, in the Eastern Mojave Desert. Herpetological Monographs 8:60-71.

Oles, L. 2007. Effectiveness of Raptor Perch-deterrent Devices on Power Poles for Reducing Secondary Effects on Prey Species. Resource Note 84.

Oregon Department of Fish and Wildlife (ODFW). 2009. Recommendations for Greater Sage-grouse Habitat Classification under Oregon Department of Fish and Wildlife's Fish and Wildlife Habitat Mitigation Policy. ODFW Report OAR 635-415-0000.

Osmundson, D. B. and G. C. White. 2009. Population Status and Trends of Colorado Pikeminnow of the Upper Colorado River, 1991-2005. Final Report. U. S. Fish and Wildlife Service, Grand Junction, Colorado.

Oyler-McCance, S. J., S. E. Taylor, and t. W. Quinn. 2005. A Multilocus Population Genetic Survey of the Greater Sage-grouse across their Range. Molecular Ecology 14:1293-1310.

Patten, M. A. 2005. Yuma Clapper Rail: *Rallus longirostris yumanensis*. Species Account Prepared for the Bureau of Land Management, County of San Bernardino, and City of Barstow in Support of the Final Environmental Impact Report and Statement for the West Mojave Plan: A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment. January 2005.

Peregrine Fund. 2013. California Condor (*Gymnogyps californianus*), Recovery Program: Population Size and Distribution, November 30, 2013. Overview Page.

Peregrine Fund. 2008. California Condor Restoration – 2007 Report. Internet website: http://www.peregrinefund.org/conserve_category.asp?category=California%20Condor%20Restoration. Accessed January 4, 2012.

Pizzimenti, J. J. and G. D. Collier. 1975. *Cynomys parvidens*. Mammalian Species 52:1-3. Internet website: http://www.jstor.org/stable/3503977. Accessed December 12, 2013.

Platte River Recovery Implementation Program. 2014. 2012-2013 Interior Least Tern and Piping Plover Monitoring and Research Report for the Central Platte River, Nebraska. June 2014.

Player, R. L. and P. J. Urness. 1982. Habitat Manipulation for Reestablishment of Utah Prairie Dogs in Capitol Reef National Park. Great Basin Naturalist 42:517-523.

Pruett, C. L., M. A. Patten, and D. H. Wolfe. 2009a. It's Not Easy Being Green: Wind Energy and a Declining Grassland Bird. BioScience 59(3):257-262.

Pruett, C. L., M. A. Patten, and D. H. Wolfe. 2009b. Avoidance Behavior by Prairie Grouse: Implications for Development of Wind Energy. Conservation Biology 23(5):1253-1259.

Robel, R. J., J. A. Harrington, Jr., C. A. Hagen, J. C. Pitman, and R. R. Reker. 2004. Effect of Energy Development and Human Activity on the Use of Sand Sagebrush Habitat by Lesser Prairie-chickens in Southwestern Kansas. Transactions of the North American Wildlife and Natural Resources Conference 69:251-266.

Robinson, J. D. 2007. Ecology of Two Geographically Distinct Greater Sage-grouse Populations Inhabiting Utah's West Desert. Master of Science Thesis. Utah State University. 144 pp.

Rosenberg, K. V., R. D. Ohmart, W. C. Hunter, and B. W. Anderson. 1991. Birds of the Lower Colorado River Valley. University of Arizona Press, Tucson.

Ruediger, B., J. Claar, S. Gniadek, B. Holt, L. Lewis, S. Mighton, B. Naney, G. Patton, T. Rinaldi, J. Trick, A. Vandehey, F. Wahl, N. Warren, D. Wenger, and A. Williamson. 2000. Canada Lynx Conservation Assessment and Strategy. USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, and USDI National Park Service. Forest Service Publication #R1-00-53. Missoula, Montana. 142 pp.

Sage-grouse National Technical Team (NTT). 2011. A Report on National Greater Sage-grouse Conservation Measures. December 21, 2011. National Greater Sage-grouse Conservation Measures/Planning Strategy.

Savereno, A. J., L. A. Saverno, R. Boettcher, and S. M. Haig. 1996. Avian Behavior and Mortality at Power Lines in Coastal South Carolina. Wildlife Society Bulletin 24(4):636-648. Internet website: http://www.jstor.org/stable/3783152. Accessed November 11, 2012.

Schroeder, M. A., C. L. Aldridge, A. D. Apa, J. R. Bohne, C. E. Braun, S. D. Bunnell, J. W. Connelly, P. A. Deibert, S. C. Gardner, M. A. Hilliard, G. D. Kobriger, S. M. Mcadam, C. W. Mccarthy, J. J. Mccarthy, L. L. Mitchell, E. V. Rickerson, and S. J. Stiver. 2004. Distribution of Sage-grouse in North America. The Condor 106:363-376.

Schroeder, M. A., J. R. Young, and C. E. Braun. 1999. Sage-grouse (*Centrocercus urophasianus*). Pages 1-28 In: A. Poole and F. Gill, Editors. The Birds of North America, No. 425. Philadelphia, Pennsylvania, USA.

Schroeder, M. A. 1997. Unusually High Reproductive Effort by Sage Grouse in a Fragmented Habitat in North-central Washington. The Condor 99:933-941.

Schwartz, M. K., L. S. Mills, K. S. McKelvey, L. F. Ruggiero, and F. W. Allendorf. 2002 . DNA Reveals High Dispersal Synchronizing the Population Dynamics of Canada Lynx . Nature 415:520-522 pp.

Science Applications International Corporation (SAIC). 2001. An Assessment of Sage-grouse and Sharp-tailed Grouse Habitat in Transmission Line Corridors Associated with the Hells Canyon Hydroelectric Complex. Technical Report.

Seiler, A. 2005. Predicting Locations of Moose-vehicle Collisions in Sweden. Journal of Applied Ecology 42(2):371-382.

Sidle, J. G. and G. A. Faanes. 1997. Platte River Ecosystem Resources and Management, with Emphasis on the Big Bend Reach in Nebraska. Internet website: http://www.npwrc.usgs.gov/ resource/habitat/plrivmgt/effects.htm. Accessed July 15, 2014.

Siegel, H. S. 1980. Physiological Stress in Birds. Bioscience 30(8):529-534.

Slater, S. J. and J. P. Smith. 2010. Effectiveness of Raptor Perch Deterrents on an Electrical Transmission Line in Southwestern Wyoming. Journal of Wildlife Management 74(5):1080-1088.

Snyder, N. F. and N. J. Schmitt. 2002. California Condor (*Gymnogyps californianus*), The Birds of North America Online (A. Poole, Editor.). Ithaca: Cornell Lab of Ornithology. Retrieved from the Birds of North America Online. Internet website: http://bna.birds.cornell.edu/bna/species/610doi:10.2173/bna.610.

Snyder, N. F. and A. M. Rea. 1998. California Condor. In: The Raptors of Arizona. R. L. Glinski, editor. The University of Arizona Press, Tucson, Arizona. 220 pp.

Snyder, N. F. R. and J. A. Hamber. 1985. Replacement-clutching and Annual Nesting of California Condors. Condor 87:374-378.

Snyder, S. A. 1991. *Canis lupus*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Internet website: http://www.feis-crs.org/beta/. Accessed December 27, 2013.

Sogge, M. K., D. Ahlers, and S. J. Sferra. 2010. A Natural History Summary and Survey Protocol for the Southwestern Willow Flycatcher: U.S. Geological Survey Techniques and Methods 2A-10, 38 pp.

Sogge, M. K, S. J. Sferra, T. D. McCarthey, S. O. Williams, III, and B. E. Kus. 2001. Southwestern Willow Flycatcher 2000 Survey and Nest Monitoring Report. U.S. Geological Survey.

Sogge, M. K., R. M. Marshall, S. J. Sferra, and T. J. Tibbitts. 1997. A Southwestern Willow Flycatcher Natural History Summary and Survey Protocol. National Park Service Technical Report NPS/NAUCPRS/NRTR97/12/. 34 pp.

Sorenson, K., A. Yi Qi, and E. Stoutenburg. 2009. California Condors and the Potential for Wind Power in Monterey County. Ventana Wildlife Society and Stanford University's Solar and Wind Energy Project.

South Central Sage-grouse Working Group (SCSGWG). 2007. South Central Sage-grouse Conservation Plan. Prepared by The South Central Sage-grouse Working Group. 81 pp.

Southern Nevada Intertie Project (SNIP). 2010. Mojave Desert Tortoise Survey Report for the Southern Nevada Intertie Project. Prepared for and under the Direction of: Bureau of Land Management, Bureau of Reclamation, and Western Area Power Administration. Prepared by EPG on Behalf of Great Basin Transmission, LLC. 118 pp.

Southwest Wyoming Local Sage-grouse Working Group. 2007. Southwest Wyoming Sage-grouse Conservation Assessment and Plan. Prepared by The Southwest Wyoming Local Sage-grouse Working Group. 109 pp.

Spotila, J. R., L. C. Zimmerman, C. A. Binckley, J. S. Grumbles, D. C. Rostal, A. List, Jr., E. C. Beyer, K. M. Philips, and S. J. Kemp. 1994. Effects of Incubation Conditions on Sex Determination, Hatching Success, and Growth of Hatchling Desert Tortoises, *Gopherus agassizii*. Herpetological Monographs 8:103-116.

State of Nevada. 2012. Strategic Plan for Conservation of Greater Sage-grouse in Nevada. Governor Sandoval's Greater Sage-grouse Advisory Committee. July 31, 2012.

Steadman D. W. and N. G. Miller. 1987. California Condor Associated with Spruce-jack Pine Woodland in the Late Pleistocene of New York. Quaternary Research 28:415–426.

Steenhof, K., M. N. Kochert, and J. A. Roppe. 1993. Nesting by Raptors and Common Ravens on Electrical Transmission Line Towers. Journal of Wildlife Management 57(2):271-281. Internet website: http://www.jstor.org/stable/3809424. Accessed November 28, 2012.

Stevens, B. S., K. P. Reese, J. W. Connelly, and D. D. Musil. 2012. Greater Sage-grouse and Fences: does Marking Reduce Collisions?. Wildlife Society Bulletin Volume 36, issue 2, pages 297-303. June 012.

Stiver, S. J., A. D. Apa, J. R. Bohne, S. D. Bunnell, P. A. Deibert, S. C. Gardner, M. A. Hilliard, C. W. McCarthy, and M. A. Schroeder. 2006. Greater Sage-grouse Comprehensive Conservation Strategy. Western Association of Fish and Wildlife Agencies. Unpublished Report. Cheyenne, Wyoming.

Stohlgren, T. J., D. T. Barnett, and J. T. Kartesz. 2003. The Rich Get Richer: Patterns of Plant Invasions in the United States. Frontiers in Ecology and the Environment 1(1):11-14.

Stohlgren T. J., D. Binkley, G. W. Chong, M. A. Kalkhan, L. D. Schell, K. A. Bull, Y. Otsuki, G. Newman, M. Bashkin, and Y. Son. 1999. Exotic Plant Species Invade Hot Spots of Native Plant Diversity. Ecological Monographs 69(1):25-46.

Sutter, J. V., M. E. Andersen, K. D. Bunnell, M. F. Canning, A. G. Clark, D. E. Dolsen, and F. P. Howe. 2005. Utah Comprehensive Wildlife Conservation Strategy. Utah Division of Wildlife Resources Publication Number 05-19.

Terres, J. K. 1980. The Audubon Society Encyclopedia of North American Birds. Alfred A. Knopf, New York. 1109 pp.

Thompson, L. S. 1978. Mitigation through Engineering and Habitat Modification. In: Impacts of Transmission Lines on Birds in Flight: Proceedings of a Workshop. M. L. Avery, Editor. U.S. Fish and Wildlife Service (USFWS). FWS/OBS 78-48, Washington, D.C. Pages 51-92.

Tilley, D., L. St. John, and D. Ogle. 2010. Plant Guide for Atwood's Phacelia (*Phacelia argillacea*). USDA-Natural Resources Conservation Service, Idaho Plant Materials Center. Aberdeen, Idaho.

Turner, F. B., P. Hayden, B. L. Burge, and J. B. Roberson. 1986. Egg Production by the Desert Tortoise (*Gopherus agassizii*) in California. Herpetological 42(1):93-104.

Ulev, E. 2007. *Lynx canadensis*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Internet website: http://www.feis-crs.org/beta/. Accessed December 18, 2013.

U.S. Fish and Wildlife Service (USFWS). 2015a. E-mail from N. Brown, USFWS, to A. Newman, ICF, determining that the Proposed Action would have no effect on Utah prairie dog relocation sites. March 26, 2015.

U.S. Fish and Wildlife Service (USFWS). 2015b. E-mail from A. Defreese, USFWS, to A. Newman, ICF, regarding recent western yellow-billed cuckoo detections in the Uintah Basin, Utah. April 2, 2015.

U.S. Fish and Wildlife Service (USFWS). 2014a. Service Review of the 2013 Wolf Population in the NRM DPS. Mike Jimenez, Wolf Management and Science Coordinator for the NRM. April 21, 2014.

U.S. Fish and Wildlife Service (USFWS) Ecological Conservation Online System (ECOS). 2014b. Species Profiles for Various Species. Internet website: http://ecos.fws.gov/ecos/indexPublic.do. Accessed 2014.

U.S. Fish and Wildlife Service (USFWS). 2014c. Revised Recovery Plan for the Pallid Sturgeon (*Scaphirhynchus albus*). U.S. Fish and Wildlife Service, Denver, Colorado. 115 pp.

U.S. Fish and Wildlife Service (USFWS). 2014d. Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for the Contiguous U.S. Distinct Population Segment of the Canada Lynx and Revised Distinct Population Segment Boundary, Final Rule. 79 FR 54782.

U.S. Fish and Wildlife Service (USFWS). 2013a. Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for the Contiguous U.S. Distinct Population Segment of the Canada Lynx and Revised Distinct Population Segment Boundary, Proposed Rule. 78 FR 59429.

U.S. Fish and Wildlife Service (USFWS). 2013b. Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for the Contiguous U.S. Distinct Population Segment of the Canada Lynx and Revised Distinct Population Segment Boundary. Department of the Interior. U.S. Fish and Wildlife Service. 78 FR 59430.

U.S. Fish and Wildlife Service (USFWS). 2013c. Mexican Spotted Owl (*Strix occidentalis lucida*): Species Profile. Internet website: http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B074. Accessed December 27, 2013.

U.S. Fish and Wildlife Service (USFWS). 2013d. California Condor (*Gymnogyps californianus*), 5-year Review: Summary and Evaluation. U.S. Fish and Wildlife Service Pacific Southwest Region. 64 pp.

U.S. Fish and Wildlife Service (USFWS). 2013e. Mexican Spotted Owl (*Strix occidentalis lucida*): Species Profile. Internet website: http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B074. Accessed December 27, 2013.

U.S. Fish and Wildlife Service (USFWS). 2013f. Bonytail (*Gila elegans*), Colorado Pikeminnow (*Ptychocheilus lucius),* Humpback Chub (*Gila cypha*), and Razorback Sucker (*Xyrauchen* texanus). About the Upper Colorado River Endangered Fish Recovery Program. Internet website: http://www.coloradoriverrecovery.org/general-information. Accessed December 16 and December 20, 2013.

U.S. Fish and Wildlife Service (USFWS). 2013g. Virgin River Chub (*Gila seminude*). Nevada Fish and Wildlife Office. Internet website: http:www.fws.gov/Nevada/protected_species/fish/species/vr_chub.html. Accessed December 26, 2013.

U.S. Fish and Wildlife Service (USFWS). 2013h. Clay Phacelia (*Phacelia argillacea*) 5-Year Review: Summary and Evaluation. U.S. Fish and Wildlife Service Utah Field Office Ecological Services. August 19, 2013.

U.S. Fish and Wildlife Service (USFWS). 2013i. Clay Phacelia Conservation Measures. August 28, 2013. 31 pp.

U.S. Fish and Wildlife Service (USFWS). 2013j. Recovery Plan for the Black-footed Ferret (*Mustela nigripes*). U.S. Fish and Wildlife Service, Denver, Colorado. 130 pp.

U.S. Fish and Wildlife Service (USFWS). 2013k. Endangered and Threatened Wildlife and Plants; Proposed Threatened Status for the Western Distinct Population Segment of the Yellow-billed Cuckoo (*Coccyzus americanus*). Department of the Interior, U.S. Fish and Wildlife Service. 78 FR 61622.

U.S. Fish and Wildlife Service (USFWS). 2013l. Greater Sage-grouse (*Centrocercus urophasianus*) Conservation Objectives: Final Report. U.S. Fish and Wildlife Service, Denver, Colorado. February 2013.

U.S. Fish and Wildlife Service (USFWS). 2012a. Lower 48 State and Mexico Gray Wolf (*Canis lupus*) listing, as revised. 5-Year Review: Summary and Evaluation. U.S. Fish and Wildlife Service. Washington Office, Arlington, Virginia.

U.S. Fish and Wildlife Service (USFWS). 2012b. Utah Prairie Dog (*Cynomys parvidens*): 5-year Review: Summary and Evaluation. U.S. Fish and Wildlife Service, Utah Field Office – Ecological Services, West Valley City, Utah. 186 pp.

U.S. Fish and Wildlife Service (USFWS). 2012c. Razorback Sucker (*Xyrauchen texanus*) 5-Year Review: Summary and Evaluation. USFWS, Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado. 38 pp.

U.S. Fish and Wildlife Service (USFWS). 2012d. Bonytail (*Gila elegans*) 5-Year Review: Summary and Evaluation. U.S. Fish and Wildlife Service Upper Colorado River Endangered Fish Recovery Program Denver, Colorado July 2012.

U.S. Fish and Wildlife Service (USFWS). 2012e. Utah Prairie Dog (*Cynomys parvidens*): Revised Recovery Plan. U.S. Fish and Wildlife Service, West Valley City, Utah. 169 pp.

U.S. Fish and Wildlife Service (USFWS). 2012f. Whooping Crane (*Grus americana*) 5-Year Review: Summary and Evaluation. U.S. Fish and Wildlife Service Aransas National Wildlife Refuge, Austwell, Texas and Corpus Christi Ecological Service Field Office, Texas.

U.S. Fish and Wildlife Service (USFWS). 2011a. Revised Recovery Plan for the Mojave Population of the Desert Tortoise (*Gopherus agassizzi*). Region 8, Pacific Southwest Region U.S. Fish and Wildlife Service, Sacramento, California. 246 pp.

U.S. Fish and Wildlife Service. 2011b. Colorado Pikeminnow (*Ptychocheilus lucius*) 5-Year Review: Summary and Evaluation. USFWS, Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado, 28 pp.

U.S. Fish and Wildlife Service. 2011c. Humpback Chub (*Gila cypha*) 5-Year Review: Summary and Evaluation. USFWS, Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado, 29 pp.

U.S. Fish and Wildlife Service (USFWS). 2011d. *Astragalus desereticus* Deseret Milkvetch 5-Year Review Summary and Evaluation. U.S. Fish and Wildlife Service, Region 6, Denver, Colorado. July 2011. 28 pp.

U.S. Fish and Wildlife Service (USFWS). 2011e. Gray Wolf (*Canis lupis*) Biologue. U.S. Fish and Wildlife Service. Internet website: http://www.fws.gov/midwest/wolf/aboutwolves/biologue.htm . Accessed on July 15, 2014.

U.S. Fish and Wildlife Service (USFWS). 2010a. Yuma Clapper Rail (*Rallus longirostris yumanensis*) Recovery Plan. Draft First Revision. U.S. Fish and Wildlife Service, Southwest Region, Albuquerque, New Mexico.

U.S. Fish and Wildlife Service (USFWS). 2010b. Mojave Population of the Desert Tortoise (*Gopherus agassizii*): 5-year review, Summary and Evaluation. U.S. Fish and Wildlife Service Desert Tortoise Recovery Office. Reno, Nevada. 121 pp.

U.S. Fish and Wildlife Service (USFWS). 2010c. Endangered Species: Mountain-Prairie Region: U.S. Fish and Wildlife Service. Internet website: http://www.fws.gov/mountain-prairie/species/mammals/UTprairiedog/index.htm. Accessed January 4, 2012.

U.S. Fish and Wildlife Service (USFWS). 2010d. Endangered and Threatened Wildlife and Plants; 12-Month Findings for Petitions to List the Greater Sage-grouse (*Centrocercus urophasianus*) as Threatened or Endangered.

U.S. Fish and Wildlife Service (USFWS). 2009. Desert Tortoise (Mojave Population) Field Manual: (*Gopherus agassizii*). Region 8, Sacramento, California.

U.S. Fish and Wildlife Service (USFWS). 2008a. Draft Revised Recovery Plan for the Mojave Population of the Desert Tortoise (*Gopherus agassizii*). U.S. Fish and Wildlife Service, California and Nevada Region, Sacramento, California. 209 pp.

U.S. Fish and Wildlife Service (USFWS). 2008b. The Virgin River Fishes Woundfin (*Plagopterus argentissimus*) and Virgin River Chub (*Gila seminude*) Five-Year Review: Summary and Evaluation. USFWS, Utah Field Office, West Valley City, Utah.

U.S. Fish and Wildlife Service (USFWS). 2008c. Black-footed Ferret (*Mustela nigripes*). 5-year Status Review: Summary and Evaluation.

U.S. Fish and Wildlife Service (USFWS). 2006a. Yuma Clapper Rail 5-year Review: 2006. U.S. Fish and Wildlife Service. Southwest Regional. Arizona Ecological Services Office.

U.S. Fish and Wildlife Service (USFWS). 2006b. Range-wide Monitoring of the Mojave Population of the Desert Tortoise: 2001- 2005 Summary Report. Report by the Desert Tortoise Recovery Office, U.S. Fish and Wildlife Service, Reno, Nevada.

U.S. Fish and Wildlife Service (USFWS). 2005. Recovery Outline: Contiguous United States Distinct Population Segment of the Canada Lynx. U.S. Fish and Wildlife Service, Region 6. 21 pp.

U.S. Fish and Wildlife Service (USFWS). 2002a. Southwestern Willow Flycatcher Recovery Plan. Albuquerque, New Mexico. i-ix + 210 pp., Appendices A-O.

U.S. Fish and Wildlife Service. 2002b. Bonytail (*Gila elegans*) Recovery Goals. Amendment and Supplement to the Colorado Squawfish Recovery Plan. U.S. Fish and Wildlife Service, Mountain-Prairie Region 6, Denver, Colorado.

U.S. Fish and Wildlife Service. 2002c. Colorado Pikeminnow (*Ptychocheilus lucius*) Recovery Goals. Amendment and Supplement to the Colorado Squawfish Recovery Plan. U.S. Fish and Wildlife Service, Mountain-Prairie Region 6, Denver, Colorado.

U.S. Fish and Wildlife Service. 2002d. Humpback Chub (*Gila cypha*) Recovery Goals. Amendment and Supplement to the Humpback Chub Recovery Plan. U.S. Fish and Wildlife Service, Mountain-Prairie Region 6, Denver, Colorado.

U.S. Fish and Wildlife Service (USFWS). 2002e. Razorback Sucker (*Xyrauchen texanus*) Recovery Goals. Amendment and Supplement to the Razorback Sucker Recovery Plan. USFWS, Mountain-Prairie Region 6, Denver, Colorado.

U.S. Fish and Wildlife Service (USFWS). 2001. Endangered and Threatened Wildlife and Plants; 12-Month Finding for a Petition to list the Yellow-billed cuckoo (*Coccyzus americanus*) in the Western Continental United States. Federal Register Vol. 66, No. 143 page 38611.

U.S. Fish and Wildlife Service (USFWS). 1999. June Sucker (*Chasmites liorus*) Recovery Plan. U.S. Fish and Wildlife Service, Denver, Colorado .61 pp.

U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service. 1998. Endangered Species Act Consultation Handbook. Procedures for Conducting Consultation and Conference Activities under Section 7 of the Endangered Species Act. March 1998 Final.

U.S. Fish and Wildlife Service (USFWS). 1996a. California Condor Recovery Plan, Third Revision. Portland, Oregon. 62 pp.

U.S. Fish and Wildlife Service (USFWS). 1996b. Recovery Plan for the Rare Aquatic Species of the Muddy River Ecosystem. USFWS, Mountain-Prairie Region 1, Portland, Oregon.60 pp.

U.S. Fish and Wildlife Service (USFWS). 1995a. Endangered and Threatened Wildlife and Plants; Final Rule Determining Endangered Status for the Southwestern Willow Flycatcher. Federal Register 60:10694 (February 27, 1995).

U.S. Fish and Wildlife Service (USFWS). 1995b. Virgin River Fishes Recovery Plan. USFWS, Mountain-Prairie Region 6, Denver, Colorado.41 pp.

U.S. Fish and Wildlife Service (USFWS). 1994. Endangered and Threated Wildlife and Plants; Determination of Critical Habitat for the Mojave Population of Desert Tortoise: Final Rule. U.S. Fish and Wildlife Service. 59 FR 5820.

U.S. Fish and Wildlife Service (USFWS). 1993. Pallid Sturgeon Recovery Plan. U.S. Fish and Wildlife Service, Bismarck, North Dakota. 55 pp.

U.S. Fish and Wildlife Service (USFWS). 1990a. Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the Mojave Population of the Desert Tortoise. U.S. Fish and Wildlife Service. Federal Register 55:12178-12191.

U.S. Fish and Wildlife Service (USFWS). 1990b. Recovery Plan for the Interior Population of the Least Tern (*Sterna antillarum*). Department of the Interior, U.S. Fish and Wildlife Service. 90 pp.

U.S. Fish and Wildlife Service (USFWS). 1991. Utah Prairie Dog Recovery Plan. U.S. Fish and Wildlife Service, Denver, Colorado. 41 pp.

U.S. Fish and Wildlife Service (USFWS). 1988a. Black-footed Ferret Recovery Plan. U.S. Fish and Wildlife Service, Denver, Colorado. 154 pp.

U.S. Fish and Wildlife Service (USFWS). 1988b. Great Lakes and Northern Great Plains Piping Plover Recovery Plan. U.S. Fish and Wildlife Service, Twin Cities, Minnesota. 160 pp.

U.S. Fish and Wildlife Service (USFWS). 1987. Northern Rocky Mountain Wolf Recovery Plan. U.S. Fish and Wildlife Service. Denver, Colorado. 119 pp.

U.S. Fish and Wildlife Service (USFWS). 1983a. Yuma Clapper Rail (*Rallus longirostris yumanensis*) Recovery Plan. U.S. Fish and Wildlife Service. Albuquerque, New Mexico. 51 pp.

U.S. Fish and Wildlife Service (USFWS). 1983b. Endangered and Threatened Species Listing and Recovery Priority Guidelines. U.S. Fish and Wildlife Service. Federal Register 55:43098-43105.

U.S. Fish and Wildlife Service (USFWS). 1982. Clay Phacelia (*Phacelia argillacea*) Atwood Recovery Plan. Prepared by the *Phacelia argillacea* Recovery Committee.

U.S. Fish and Wildlife Service (USFWS). 1980. Northern Rocky Mountain Wolf Recovery Plan. U.S. Fish and Wildlife Service.

U.S. Fish and Wildlife Service (USFWS). 1978. Final Rule: Determination of Critical Habitat for the Whooping Crane. U.S. Fish and Wildlife Service, Department of the Interior. 43 FR 20938 20942.

U.S. Fish and Wildlife Service (USFWS). 1973. Threatened Wildlife of the United States. 1973 Edition. U.S. Department of the Interior, Fish and Wildlife Service, Bureau of Sport Fisheries and Wildlife. 289 pp.

U.S. Fish and Wildlife Service, Montana Fish, Wildlife & Parks, Nez Perce Tribe, National Park Service, Blackfeet Nation, Confederated Salish and Kootenai Tribes, Wind River Tribes, Washington Department of Wildlife, Oregon Department of Wildlife, Utah Department of Natural Resources, and USDA Wildlife Services. 2011. Rocky Mountain Wolf Recovery 2010 Interagency Annual Report. C.A. Sime and E. E. Bangs, eds. USFWS, Ecological Services, 585 Shepard Way, Helena, Montana. 59601.

U.S. Forest Service (USFS). 2007a. Northern Rockies Lynx Management Direction Record of Decision. USDA Forest Service. National Forests in Montana, and parts of Idaho, Wyoming, and Utah. March 2007. 71 pp.

U.S. Forest Service (USFS). 2007b. Final Environmental Impact Statement Northern Rockies Lynx Management Direction; Figure 1-1 Occupied and Unoccupied Lynx Habitat. February 21, 2007.

U.S. Forest Service (USFS). 2006. Southern Rockies Lynx Habitat. Map of Habitat. Internet website: http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5357382.jpg

U.S. Forest Service and U.S. Fish and Wildlife Service (USFS and USFWS). 2005. Canada Lynx Conservation Agreement U.S. Forest Service and U.S. Fish and Wildlife Service. USFWS Agreement Number 00-MU-11015600-013.

U.S. Geological Survey (USGS). 2011. Modeling habitat of the desert tortoise (*Gopherus agassizii*) in the Mojave and Parts of the Sonoran Deserts of California, Nevada, Utah, and Arizona. U.S. Department of the Interior: U.S. Geological Survey. 18 pp.

Unitt, P. 1987. *Empidonax traillii extimus*: An Endangered Subspecies. Western Birds 18:137-162.

Utah Division of Wildlife Resources (UDWR). 2014. June Sucker (*Chasmistes liorus*). Internet website: http://dwrcdc.nr.utah.gov/rsgis2/search/Display.asp?FINm=chaslior.

Utah Division of Wildlife Resources (UDWR). 2013. June Sucker (*Chasmistes liorus*). Wildlife Notebook Series Number 25, 4 pp.

Utah Division of Wildlife Resources (UDWR). 2011. California Condors – Rescued from the Brink of Extinction. Internet website: http://wildlife.utah.gov/condors/ . Accessed November 18, 2011.

Utah Division of Wildlife Resources (UDWR). 2009. Utah Greater Sage-grouse Management Plan. Utah Department of Natural Resources, Division of Wildlife Resources, Publication 09-17, Salt Lake City, Utah.

Utah Natural Heritage Program (UNHP). 2010. Species Occurrence Data for the Canada Lynx. Utah Natural Heritage 2010 GIS data set.

Ventana Wildlife Society (VWS). 2007. California Condor Reintroduction. Internet website: http://www.ventanaws.org/species_condors/.

Voigt, D. R., G. B. Kolenosky, and D. H. Pimlott. 1976. Changes in Summer Foods of Wolves in Central Ontario. Journal of Wildlife Management 40(4):663-668.

Wakkinen, W. L., K. P. Reese, and J. W. Connelly. 1992. Sage-grouse Nest Locations in Relation to Leks. The Journal of Wildlife Management 56(2):381-383.

Washington Department of Fish and Wildlife (WDFW). 2008. Greater Sage-grouse and the Proposed Withrow Wind Farm. 20 June 2008.

Watson, J. 1997. The Golden Eagle. London: T. and A. D Poyser.

Wilbur, S. R. 1978. The California Condor, 1966–76: A Look at its Past and Future. U.S. Fish and Wildlife Service. North American Fauna 72:1–136.

Wyoming Game and Fish Department (WGFD). 2012. Personal communication from K. Nordyke. Discussion of the availability of winter habitat GIS data for Wyoming.

Wyoming Game and Fish Department (WGFD). 2010. State Wildlife Action Plan 2010.

Wyoming Game and Fish Department (WGFD). 2003. Wyoming Greater Sage-grouse Conservation Plan.

8.0 List of Preparers

AECOM Team Member	Responsibility/Resource	Degree/Certification	Experience (years)
Spencer Martin	ESA/Biological Task Lead	M.E.M. Resource Ecology/Conservation Biology B.A. Biology	25
Matt Petersen	Project Manager, Cumulative Impact Analysis	M.S. Aquatic Ecology B.S. Fisheries	23
David Fetter	Project Coordinator, Water Resources	B.S. Watershed Science	11
Julie Barraza	Wildlife Biology	B.S. Wildlife Biology	6
Amy Gilboy	Vegetation, Special Status Plants	M.S. Resource Ecology and Management B.S Biology	17
Rollin Daggett	Aquatic Species, Special Status Aquatic Species	M.S. Freshwater and Marine Biology B.S. Zoology	37
Andrew Newman	Wildlife Biology Lead	M.S. Natural Resource Management B.S. Conservation Biology	13
Erik Schmude	Wildlife Biologist	B.S. Wildlife Fisheries Science B.A. American Studies	11
Brent Read	GIS	M.S. Watershed Science B.S. Forestry, Concentration in Forest Fire Science	12
Brian Taylor	GIS	B.A. Geography, Emphasis in GIS	6
Jason Thoene	GIS Lead	M.S. Geographic Information Systems B.A. Geology	13
Sue Coughenour	Document Production	General Education Studies	29
Ruth Idler	Document Production, Figures/Tables	General Education Studies	24
Dora Medellin	Document Production, Literature References	General Education Studies	36

Agency Team Member	Affiliation
Bureau of Land Management	
Sharon Knowlton	Project Manager, Wyoming State Office
Christine Pontarolo	Biologist – CCFO; National Transmission Support Team
Mark Wimmer	NEPA Specialist – VFO; National Transmission Support Team
Dennis Saville	Wildlife Program Lead; Wyoming State Office
Robin Sell	Wildlife Biologist; Colorado State Office
Desa Ausmus	Biology Lead – Colorado; Little Snake Field Office
Lisa Belmonte	Wildlife, T&E Animals, Riparian; White River Field Office
Maggie Marston	Assistant Field Manager; Caliente Field Office
Ron Bolander	Botanist; Utah State Office
Robin Naeve	Utah Wildlife Co-lead; Utah State Office
Renee Chi	Sage Grouse Wildlife Biologist; Utah State Office
Mace Crane	Wildlife, T&E, Special Status Species; Fillmore Field Office
Alicia Styles	Wildlife Biologist; Caliente Field Office
Todd Trapp	Wildlife Biologist; Caliente Field Office
Carla Wise	Wildlife Biologist; Las Vegas Field Office
Western	
Steve Blazek	Project Manager
Misti Sporer	Biologist
U.S. Forest Services	
Kenton Call	IDT Leader & POC /Project Lead /Dixie NF POC
Dave Olsen	Wildlife Biologist
Chris Mease	Fisheries Biologist TEAMS
Terry Miller	Botanist TEAMS

1